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THE NUTRITIONAL SITUATION IN THE CAMPS OF THE UNOCCUPIED ZONE OF FRANCE IN 1941 AND 1942 AND ITS CONSEQUENCES*

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NIMES, FRANCE

EARLY in 1942 the Commission on Hygiene called attention to a grave danger threatening the very existence of the internment camps. Malnutrition, or the so-called "disease of starvation," had invaded them. Although its initial attack in the spring of 1941 was halted by the coming of summer, a new wave swept over the camps with the first arrival of cold weather. The disease spread rapidly, like a contagion, revealing profound physical exhaustion and extreme misery. The symptoms, slight at first, then more and more marked, became increasingly serious and showed in many respects the classic picture observed during famines, whereas other, much less well-known symptoms seemed peculiar to this particular outbreak of malnutrition. The number of deaths increased. During the first period, from September, 1941, to January, 1942, there was a daily average of 2 deaths in each camp, and in certain camps 5 every two days. Four weeks after a group of 40 patients had been transferred to a camp hospital, they were all dead.

This disease resembled an epidemic, spreading to all the barracks, penetrating into all the divisions, striking all the camps, and threatening a population of more than 10,000 men, women and adolescents. The men were affected first and seemed to be much less resistant than were the women and the young people, but later the character of this collective disease underwent profound changes.

The commission sounded the alarm at the meeting of January 14, 1942. It proposed urgent measures of assistance, and at the same time submitted them to the approval of the inspector general of the camps. The plans included the following essential features: the assignment by the commission of physician-investigators to the camps, their mission being to examine all the internees from the point of view of nutrition and to organize and co-ordinate a program of assistance by all the relief agencies in collaboration with the sanitary services of the camps; hospital care for those suffering from the disease of starvation, in barracks especially fitted out to facilitate their observation and treatment; organization of special dietary kitchens under the common responsibility of the relief agencies; provision of urgent medical treatment where it was needed, together with the administration on a large scale of dietary products, vitamins, minerals and general stimulants; and isolation of those in danger of developing serious starvation symptoms in prophylactic centers separate from the camps proper.

Today we report the first results of this program of assistance and observation. First of all we wish to express our thanks to the inspector general of the camps, by whose swift and energetic administrative measures the organization of assistance was made almost immediately possible.

The medical investigators began their work in most of the centers in February, 1942. Kitchens were organized for the cachectic (starving) patients in the most important camps. A close collaboration was established between the medical investigators and the sanitary services of the camps. Nine thousand persons have been thoroughly examined and regularly followed up.

The plan of the physicians assigned by the Commission on Hygiene included an investigation in the huts of patients affected by the syndrome of starvation, a clinical and therapeutic study of the cachectic patients under hospital care in the barracks, a study of the nutritional situation, the coordination of the different relief agencies in the camps and the elaboration of medical principles guiding their work and a critical study of the results obtained.

PRELIMINARY DATA

The investigation took the form of a methodical medical examination of all the inhabitants, section

*This report was originally presented on July 1, 1942, by the Commission on Hygiene of the Co-ordinating Committee for Relief in the Camps at Nimes, France. The commission consisted of the representatives of the organizations that, within the Co-ordinating Committee, were particularly interested in problems of general hygiene and medical care — namely, the Unitarian Service Committee (Dr. René Zimmer, medical director), the Swiss Red Cross Children's Aid (Mr. Maurice Dubois, director) and the Jewish Children's Aid Society (Dr. Joseph Weill, medical director). The purpose of the Commission was to co-ordinate the various attempts then being made to solve the medical and hygienic problems arising in the supervised concentration camps in France, to collaborate for the sanitary protection of the internees and to establish contact with the international organizations interested in these problems. The report was translated and shortened under the auspices of the Unitarian Service Committee.

by section and barrack by barrack. Of all the internees of the camps 85 to 95 per cent were thus examined. At a preliminary session they were weighed and measured, undressed. Their medical histories were noted, their pulse rates and arterial blood pressures were recorded, and whenever possible their weights before internment were ascertained. At a later session the patients were medically examined, undressed, and the findings were entered on individual record cards. The investigation had to be restricted to simple and rapid examinations, as is necessary in the study of large groups.

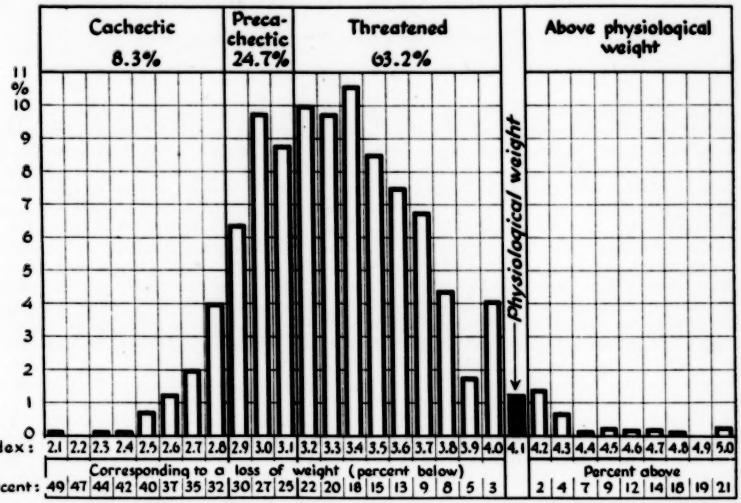

FIGURE 1. *Percentage Distribution of Male Inmates of Huts A, D, E, F, G and H. According to a Weight-Height Index (Camp Gurs: June, 1942).*

The following criteria were used for the primary classification of the patients: height and weight, condition of the skin and the adjacent subcutaneous tissues, muscular tonus, posture, condition of the cardiovascular system, the presence and location of edema and the blood picture. Such criteria were sufficient to permit classification of the patient with regard to the urgency for and importance of the treatment required by their condition.

Criteria

Measurements of height and weight. A weight-height index of all the examined persons was set up, making it possible to judge at a glance the weight conditions of the internees. The index has a practical value only if it is calculated in relation to the physiologic coefficient of weight to height, determined according to the corrected tables of Dubois-Reymond. The results of such measurements on the men and women of an entire camp are presented in Figures 1 and 2, plotted as frequency of occurrence against percentage of physiologic weight and against a weight-height index. It was necessary to take into consideration, in weighing and measuring, the errors in weight caused by the edemas and those in height caused by the frequent scolioses due to the osteopathy of starvation. It was therefore important to register whenever possible the preinternment weight and height as entered on the military identification papers of the men.

Although a considerable loss of weight in a given subject is a factor of definite prognostic value, nevertheless experience has shown that it does not allow one to pronounce his condition as irreversible. Regular weighing has more significance if it is done simultaneously for a whole camp and if the results among the cachectic patients are compared with the weight of noncachectic persons in the same camp.

It has been observed that considerably emaciated patients almost always develop hernia and that this symptom is hardly ever absent even in young men who are precachectic subjects.

Examination of skin and subcutaneous tissues. From the threatened to the cachectic stage, the atrophy progresses through all degrees, arriving finally at a stage of veritable "anatomical dissection." The degree of atrophy may best be estimated by examin-

ing the patient posteriorly. In the final stage, particularly in the case of formerly obese persons, the skin hangs on the body like a garment that has become too large.

Muscular tonus. The signs of muscular hypotony could be observed quite early in a large number of cases. This explains to a certain degree the difficulty that many patients had in standing up. In several photographs it was noticed that the subject was unable to keep his head motionless. The posture of the patients was defective. Scoliosis occurred with increasing frequency. At a certain stage the patients dropped the things they held in their hands. They became unable to make the slightest muscular effort. Measurements made with the dynamometer showed that in a number of patients the figures obtained were smaller than those that would correspond to the strength of a small boy of ten or twelve.

Position. In the advanced stage the patients were unable to stand up, and were obliged to creep on all fours to get back to their beds. It was often of interest to measure the length of time during which the patients were able to stand. After a few seconds or minutes on their feet they complained of pricking pain in the limbs and of trembling, sometimes accompanied by profuse sweating. Fainting was frequent when attempts were made to maintain a standing position and often constituted the alarm signal of the state of starvation. It was accompanied by the classic sign of empty peripheral veins.

Circulatory apparatus. Systematic registration of the pulse — rate, quality and rhythm — is important partly on account of the ease by which these measurements can be taken and partly for the valuable information that they furnish. Sometimes acceleration of the pulse, or tachycardia, was observed, sometimes a slowing, or bradycardia. At a certain stage there was sometimes irregularity of the pulse rate. The arterial blood pressure was measured in all the patients.

Edema. The edema was most significant if it was fixed, large and visceral. A characteristic physiognomy of the undernourished caused by a combination of swellings due to edema and anemia was the sign of decided physiologic disturbance.

Blood examination. Examination of blood taken at random from the undernourished showed in every case the presence of anemia.

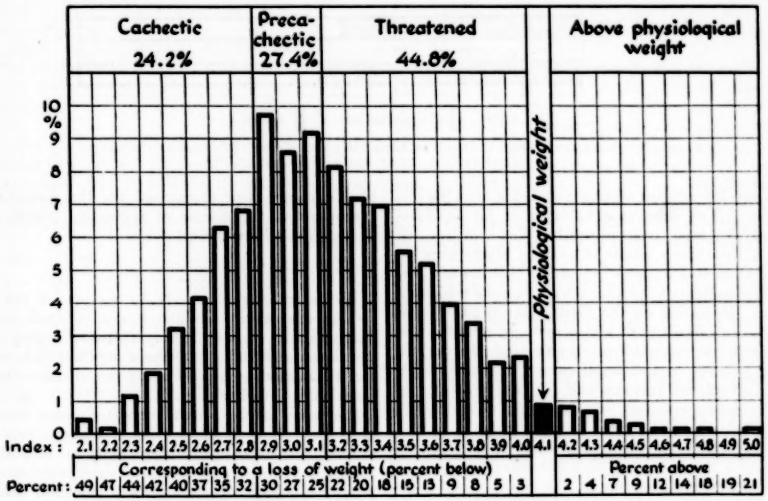

FIGURE 2. *Percentage Distribution of Female Inmates of Huts I, J, K, and L. According to a Weight-Height Index (Camp Gurs: June, 1942).*

Classification of Patients

As in the presence of a large epidemic of disease, it was important to isolate from the beginning those who were seriously affected, and furthermore to discover the first symptoms of malnutrition in others in order to limit the damage by energetic prophylactic measures. The fact that the patients exhibiting the syndrome of malnutrition were concentrated

in one place and subject to a uniform, easily controlled discipline made possible an extensive scientific analysis of the symptoms observed as well as observation of the development of the application and the study of an appropriate diet. This study may enable us to oppose effectively this syndrome, which is beginning to make its appearance among the general French population.

After examination each internee was classified under one of the following categories: cachectic, precachectic, threatened and normal.

The cachectics were immediately recognized from a distance by their extreme emaciation and their characteristic physiognomy. Their skeletonlike thinness was impressive; muscular and skin atrophy was general. The subcutaneous layer of fat had disappeared a long time previously. The skin was dry and scaly. Many adults of average height were no more than 40 kilograms in weight. The complexion of these patients was either ash gray or of a subicteric pallor, depending on the predominance either of a shade of cyanosis or of a hemolytic process, but the pallor of the mucous membranes and the anemia were features of almost all cases. Combined with their emaciated features the patients presented a corpselike appearance. The detailed clinical description of this type of patient is given below.

The precachectic patients showed the same symptoms to a lesser degree. Both muscular atrophy and anemia were less pronounced. The loss of weight was not so far advanced and the general state was less serious. The application of different tests showed that they had been affected less seriously.

The threatened patients had on the whole maintained a better general state of health than had those in the previous two categories. Here the tendency toward the edemas of starvation had begun to appear, but they were transitory, shifting and recurrent. Emaciation was, however, quite common. In this group were included the convalescents from typhoid fever and patients with acute gastric and duodenal ulcers, advanced tuberculosis and Parkinson's disease, as well as those with chronic decompensated heart disease.

In a population of 11,000 internees, of whom 9000 were examined,* there were found 331 cachectic patients (3.7 per cent), 839 precachectic patients (9.3 per cent) and 4000 threatened persons (44.4 per cent), the remainder (42.6 per cent) apparently not being in need of immediate medical attention.

Malnutrition, which imitates some of the characteristics of a virulent epidemic of communicable disease, had not yet reached its peak in the camps. Systematic investigation revealed each week new precachectic patients and those threatened with this condition.

Clinical and Therapeutic Study

According to the results of the preliminary investigation, it appeared that half the actual population of the camps was threatened by the formidable symptoms of the disease of starvation, which appeared in various clinical forms.

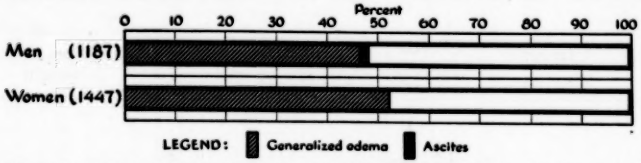

FIGURE 3. *Incidence of Edema of Starvation among Men and Women, Expressed as Percentage of Total Inmates (Camp Gurs: June, 1942).*

Clinical Forms of Starvation

Wet form. Approximately 50 per cent of the internees who were examined showed the edema of malnutrition. It was found especially among the Spaniards and Italians. Edema was not, however, the sole or pathognomonic symptom of this state of functional disturbance.

Contrary to the usually accepted ideas and to our initial observations, we found a higher proportion of edemas of starvation among women than among men. Still, a greater number of men showed bradycardia and lowered blood pressure, which proves that they had been more seriously affected. Also it was especially among men that ascites occurred with relative frequency (Fig. 3). In contrast with what has often been stated, we found that edema affected young girls between the ages of seventeen and twenty-two who had fairly regular menses.

These edemas were located similarly in a considerable proportion of the patients, in the various parts of the body as follows: the top of the feet, the malleolus on the inner side of the ankles, the region under the chin, that over the cheekbone, and the eyelids.

The soft, white edema, at first transitory and shifting, became gradually fixed after several recurrences. This was observed especially in the peripheral edemas. A certain number of cases of ascites were observed in which the patients were unaware

*It is not clear from the text of the report whether the 2000 subjects not examined were considered normal and free from medical need or whether the 3830 subjects not included among the three categories in the 9000 examined were normal. — TRANSLATOR.

of its existence or were not uncomfortable because of its presence. Ascites formed about 10 per cent of the edemas, and was more resistant to treatment with diuretics and additional feeding than was peripheral or subcutaneous edema.

Sometimes edema was observed in men showing a generally satisfactory state of health with no emaciation or other symptoms of malnutrition, with well-developed muscles, and with the subcutaneous layer of fat preserved. Almost all these men belonged to the canteen or kitchen staffs. This edema was caused by unbalanced diet or was of toxic alimentary origin.*

Certain associated symptoms occurred in all clinical forms of starvation. In addition to edema, the patients suffered from frequent urination, especially at night. This symptom was related either to the general demineralization or to the cold, because the nights were cool and the barracks drafty.† Pleural effusion, another form of visceral edema, was of more frequent appearance. It differed neither in development nor in prognosis from other forms of edema.

On the whole, the patients with edema maintained good appetites until a very advanced stage of their illness. The extreme fatigability from which they all suffered led, at a certain stage of the disease, to a persistent painful sensation. Sometimes the pain appeared only after a slight effort. Then the typical physiognomy of the starving cachectic patient appeared — the anemic and puffy features — and marked emaciation. Infection of the skin was frequent, and great sensitiveness to cold developed. The body temperature was often low, sometimes below 35°C. (95°F.).

Examination of blood taken at random from cachectic patients and those threatened with this condition showed that all were anemic. In none of the specimens examined did the red-cell count reach 4,000,000. In the great majority it was approximately 3,000,000. In hardly 5 per cent of all cases was the hemoglobin above 70 per cent. In all other cases it ranged about 60 per cent.

As regards both blood values and weight, the danger point was found to be a diminution of 30 per cent from the physiologic norm.

Urinalysis did not show pathologic features.

Dry form. The dry form was characterized by the absence of edema. It was found especially among the Spaniards and Italians — a reason for its predominance, for example, in the camp at Rivesaltes. It should be mentioned that these men had been suffering from chronic undernourishment for many years, and their ancestors for centuries. Their skin was dry, atrophied and often scaly, and the atrophy in these cases took particularly severe forms.

Anemic form. Examinations of the blood smears now under way show a certain number of hyperchromic anemias — 43 per cent of the cases studied. This finding, combined with the results of neurologic examinations, is of great pathological and therapeutic importance. It would be worth determining whether the lack of the extrinsic principle, present especially in meat, is responsible for anemias of the pernicious type, combined sometimes with the neuroanemic syndrome. It is to be noted that the patient showing the most refractory neurologic symptoms, in spite of having gained in weight, was one whose blood analysis gave a color index of 1.23, with 57 per cent hemoglobin, 2,330,000 red corpuscles and 2700 leukocytes. The sedimentation rate of these patients was not as a rule accelerated.

Petechiae with segmental distribution were observed in some cases on the dorsum of the hands and forearms.

Vasolabile form. At the beginning of the illness the blood pressure and disturbances of the circulatory system were irregular. They showed deviations from the normal in both directions, sometimes between morning and evening, especially in the case of patients less severely affected. Later hypotension became constant; it was usually combined with bradycardia, which, transitory at first, also became permanent. At that point hypotension became an indication of the gravity of malnutrition. Hypertension, which was observed more frequently than is generally supposed, in spite of the general asthenia and loss of strength that occurred in severe cases, remained permanent up to the terminal stages.

The heart, like the other muscles, seemed to suffer from hydremia and atrophy. One was frequently surprised to find a double first sound without any other sign of tachycardia. Irregularities of rhythm — partial or complete arrhythmia — were not observed oftener than under other conditions.

Neurologic form. Ataxia and Romberg's sign were the most noticeable symptoms of the neurologic form. The reflexes were as a rule exaggerated. Polyneuritic pains and paresthesias were present. Examination of the ears was usually negative. General sensitivity was normal. The rate of blood sedimentation was generally much accelerated. Some patients showed a striking mixture of the Parkinsonian and ataxic syndromes. The muscles became spastic and the movements of the hands jerky, and the feet described random semicircles on walking. Once the patients had started on their way they had a fixed posture. They seemed to throw their whole body headlong, and stopped only with difficulty. Tests of muscular strength, as for example by the methods of Barré, showed weakness, just as did tests of muscular tonicity. The knee jerks were absent. The folds of the buttocks tended to be shallow.

*Or possibly from vascular stasis related to long hours on their feet. — TRANSLATOR.

†Perhaps the bladder wall lacked tone or there was infection of the urinary tract. — TRANSLATOR.

Mental form. Patients with the mental form, whose gaze was dull and apathetic, were entirely disoriented. They answered questions in monosyllables and only after a certain delay. Weakened to an extreme degree, they collapsed on their straw mattresses. The states of mental confusion and of amnesia were impressive. Even when convalescence was advanced, the slowness of the mental processes was striking. Spasmodic laughing or crying was often observed. In some cases, in the ataxic phase preceding death, bulbar manifestations and symptoms of meningeal irritation were observed.

Lumbar puncture of the comatose patients disclosed nothing pathologic except a slight Claude's hypertension. Lumbar puncture was contraindicated, however, in such of these patients as were already in shock and suffering from circulatory abnormalities.

Conclusion. It is certain that a more protracted study will enable us better to differentiate the various forms we have mentioned and to add others. But these forms were experienced in every camp, with one form or the other predominating according to the geographic location of the camp or to the origin of the internees. The determination of these clinical categories is extremely important for the prognosis and treatment of the patients, as well as for the purpose of scientific research.

Development and Termination

Starvation led naturally to death, unless there was drastic intervention. Cold, hazardous hygienic conditions, restrictions of freedom of movement and lowered morale hastened the fatal outcome.

The meticulous observation of the different modes of death was highly instructive from the pathological point of view. One was impressed by the abrupt transition from an apparently normal state, when the patient attended to his business, to a coma that was followed by death after a more or less short interval. In other cases the patients were attacked more rapidly, in full career, as it were, and collapsed while walking or passed away in their sleep. In some other cases they expired slowly with all the signs of a progressive asthenia.

Death caused by pre-existent or contributory illnesses is not discussed here.

The chief physician of the camp at Vernet could find nothing worthy of note macroscopically in connection with the several autopsies that he had performed, except the existence of cerebral edema in some cases.

It is an interesting fact that the more experience one acquires, the less possible it becomes to predict, through persistent observation of a severe or even a hopeless case, the approximate date of death, or even to be sure of its occurrence.

During January and February, 1942, there were 45 and 49 deaths, respectively, in Camp I (about 400 internees), and 59 and 38 in Camp II (about 2800 internees). With a few exceptions the cause of death was essential malnutrition.

Complications

Tuberculosis. In one camp, well equipped for this purpose, 2000 x-ray examinations of the chest were made. Thirty cases of pulmonary tuberculosis were discovered. The affected persons were not aware of having the disease. Twenty of the cases were of the fibrosclerotic, nonprogressive type, but in 10 cases the lesions were progressive and in 3 of these there was disseminated tuberculosis.

Cardiac disease. Enlargement of the heart was found frequently among people in their fifties — 20 per cent of the inhabitants. It was not ascertained whether the apparent enlargement was due to muscular hypertrophy or whether in some cases it was due to the presence of a pericardial exudate. The aorta was ordinarily transparent along its whole course. It is also worth mentioning that the bronchovascular shadow was particularly marked.

Disease of the bones. In general, marked decalcification of the ribs and of the vertebral column was noticeable; sometimes the bony trabeculae were visible. All these symptoms are typical of the state of malnutrition. They are the signs of an abnormally intense degree of general decalcification and demineralization.

Vascular disorders. Angiospasm of the extremities of the fingers and feet was frequently observed. Certain cases were so pronounced that they suggested a diagnosis of Raynaud's disease, but administration of vitamins, especially of pellagra-preventive vitamin, brought about improvement. Freezing of the extremities, sometimes severe, occurred in a considerable number of persons in winter. There were many cases of arcus senilis, and precocious senility was frequent.

Endocrine disorders. Clinical and x-ray findings enable us to say a few words about disturbances of endocrine functions. Lack of equipment, however, has restricted investigations in this particular field.

Hyperthyroidism was rare, but there were a few cases. We plan to study this problem later when we can undertake more systematic research. There were many cases of goiter. The great proportion of pendant or pendulous goiters was astonishing. Thyroid disease was sometimes connected with the amenorrhea frequently observed — in 30 per cent of the women. Puberty seemed in young girls to be retarded. In one of the large camps there were 171 cases of amenorrhea in women between the ages of fifteen and forty-five, including the following associated conditions: bradycardia, 21 cases (12 per cent); low blood pressure, 22 cases (13 per cent); high blood pressure, 3 cases (2 per cent); and edema, 87 cases, 47 of them slight (51 per cent).

Adrenal insufficiency was not studied, but the coexistence of hypotension, hypoglycemia and asthenia awakens interest in an investigation dealing with

these characteristic functional disturbances. The existence of spermatogenic troubles, commonly occurring among the debilitated, assumes more than a theoretical importance in the camps. The presence of genital endocrine troubles makes it probable that the hypophysis is also correspondingly affected. On the other hand, it is undeniable that the not uncommon diabetic internees benefit by the starvation diet. No diabetic coma was observed. The same statement applies to various diatheses.

Prognosis

The characteristic curve of an epidemic of communicable disease shows a progressive increase in morbidity in the first stage following the outbreak, and reaches a plateau as the force of the infection begins to exhaust itself or because of effective measures taken to fight the spread of the disease. In the third stage the number of new cases progressively diminishes.

The "disease of starvation," which imitates these characteristics of an epidemic of communicable disease, has not yet reached its peak in the camps. Systematic investigation reveals each week new precachectic cases and persons newly threatened with this condition. The pathogenic factors are far from having exhausted their scope. It is possible, however, to review the elements that make a prognosis possible.

Sex. The records of the women are especially significant. Their attacks came after a delay of about ten months, and the increasing number of women actually affected by the syndrome of malnutrition illustrates eloquently the general aggravation of the situation. The fact that their caloric needs are 20 per cent less than those of men explains in part why women are better protected against starvation than are men. It seems that by now their resistance has been exhausted and that at present the prognosis for women is worse than formerly.

Seasons. There is a better chance to save a patient during the mild seasons of the year than during winter. Cold aggravates the prognosis because of the weakness and the increase in caloric requirements it causes. Edemas were observed to disappear under the sole influence of warm weather. It is certain that the persons who died in the past winter lost their lives as much because of cold as by reason of starvation. This effect of the cold on the undernourished is a frequent observation and causes among other symptoms an abnormally low body temperature. The occurrence of a large number of often severe frostbites, even at the end of winter, is connected with the damaging effect of cold on the circulation.

What has been said about the vasolabile type of starvation explains that these persons are also extremely sensitive to the effect of heat in summer, when the danger of dysentery also lies in wait for them. Thus, the two seasons with extremes of weather are full of danger for the undernourished.

Hypotension. Among the factors of prognosis is hypotension, which, once firmly established, is a more serious factor than is bradycardia.

Clinical types. Among the clinical types the neurologic and mental types of malnutrition have the most unfavorable prognosis.

Intestinal complications. The prognosis is very bad when diarrhea makes its appearance, because of the dehydration, demineralization and defective assimilation of food and vitamins that follow in its wake. It is noticeable that its frequency varies greatly in the different camps.

Purpura. The appearance of purpura is an aggravating and alarming factor.

Asthenia. The impossibility of keeping a patient in the standing position for a few minutes calls for great caution in the handling of this disease. It is absolutely necessary to impose strict rest on these patients if one would avoid exposing them to the danger of an accidental death, which may occur after an untimely or unsupervised rising, often in response to orders.

Atrophy. Pronounced atrophy and intense emaciation are inseparable companions of cachexia, and they suggest an unfavorable prognosis.

Therapeutic intervention. The chances of recovery depend on the age of the patient, on the season of the year, on a certain number of factors enumerated above, on early treatment and above all on the intensity of the chosen treatment. In contrast to the general belief, there is no state, except the final coma, when the disease is irreversible. In spite of striking loss of weight, profound asthenia and a dangerous general condition of health, it was possible to save, through energetic and persistent therapeutical effort, patients who were considered beyond help. This knowledge has a valuable social significance and seriously modifies all our pathological and therapeutic conceptions.

Hypovitaminoses

The exact role of vitamin deprivation in malnutrition cannot be evaluated at present. Although the signs of insufficient caloric intake — loss of weight, emaciation and so forth — are obvious, clinical research is not yet advanced enough to establish with certainty a causal relation between a certain type of malnutrition and a corresponding hypovitaminosis. Moreover, the need for vitamins varies and depends on individual physiologic factors and endogenous influences that regulate the differences in the absorption and utilization of vitamins. At present we must limit ourselves to a review of the different manifestations of the early stage of starvation, without attempting to establish too definite causal connections among the different groups of facts.

Vitamin C. We have already mentioned some patients with a segmental distribution of petechiae on the back of the hands and forearms. Bloody suf-

fusions of the gums and unusually severe hemorrhages were also described by dentists. It was noticed that the vegetables served in the camps were especially poor in vitamins C and D. Therapy with vitamin C gave satisfactory results in these cases. It has not been possible up to the present to determine the elimination of vitamin C in the urine and to proceed to tests of saturation.

Vitamin D. There are many cases of rachitis among the children. The number of severe forms is not alarming, but there are many painful ones. The proportion of scolioses is large. Luckily most of these patients are not beyond recovery. Careful supervision and systematic and early treatment are indispensable. Caries of the teeth is widely prevalent, but the physicians are particularly struck by the cases of gingivitis and periostitis. In a number of cases the loss of fingernails was checked under the influence of a combined antirachitic, calcium and vitamin treatment.

Vitamin A. Recovery by the use of vitamin A was observed in a certain number of persistent eczemas and trophic ulcers occurring among young people. There were 2 cases of xerophthalmia. In certain cases, night blindness was observed. On account of lack of equipment only empirical methods were used; therefore a precise determination of the percentage of the affected cases was not possible. There were several cases of precocious presbyopia. Sometimes there were striking cases of pallor involving the whole pupil, — 10 per cent of the cases, — although the optic nerve was not diseased and there were no errors of refraction. In the opinion of all the physicians who have examined the internees, the lack of vitamin A is particularly noticeable.

Vitamin B. The good therapeutic results observed in the mental and neurologic cases, as well as in cases of neuroanemia after the administration of vitamin B_1 and brewer's yeast, indicate a lack of vitamin B_1 in these cases. The prevalence of meteorism in almost the entire population of internees is equally striking. Lack of vitamin B_1, hindering the assimilation of food, can be suspected of playing a decisive role in producing this symptom.

It would be interesting to know whether the numerous cases of diarrhea were caused partly by deficiency of pellagra-preventive vitamin. This possibility must be especially considered if a severe enteritis is accompanied by glossitis or aphthous stomatitis. These cases were more frequent than is ordinarily supposed. The sudden disappearance of all symptoms after two days' treatment with the amide of nicotinic acid proves that these disorders result from a vitamin deficiency.

Study of the Nutritional Situation

It is obvious that the state of functional distress found in the internees is brought about by quantitative and qualitative inadequacies in the food supply. Before starting on the study and interpretation of the nutrient value of the food supplies in question, however, it seems advisable to give a review and a summary of the elementary facts regarding the caloric or energy principles of nutrition. It is sufficient to review briefly the indispensable elements of a normal ration and to compare it with the ration served to the internees in the camps.

The standard figures established by the Committee of the Health Section of the League of Nations in 1936 for a normal daily ration state that an adult of medium weight, at absolute rest, requires a daily ration of 2000 calories. The expenditure of energy of the same person leading an ordinary life without manual labor is 2400 calories. The additional expenditure of the muscles in case of light work amounts to 75 calories an hour, or about 600 calories a day, which gives the total of 3000 calories. When the energy value of the ration — that is, the caloric supply it furnishes — is lower than what is spent, the organism has to draw on its resources to make up the deficit by using up its own tissues.

Nutritional deficiency produces a more or less considerable emaciation, in the first place, according to the degree of insufficiency of the food supply. In order to provide for the unavoidable, minimal physiologic expenditure, the organism first uses up the most calorigenic substances, giving the greatest return combined with the least possible spending — that is, fats. This borrowing from the adipose tissue is not deleterious provided that it does not proceed beyond a certain limit and that the balance of the ration is kept above the minimum.

The menace of malnutrition begins when this supply of fat gives out. The proteins provided by the muscular and organic tissues are then called on to furnish the missing balance. From this point on the emaciation is more conspicuous, because the proteins furnish only 4 calories to the gram, — that is, only half the amount provided by 1 gm. of fatty substance. The attack on the protein reserve brings about the most disastrous consequences, because the organism is compelled to draw its supplementary caloric needs from the tissues of superior importance — the muscles and viscera. At this state, catastrophic emaciation is observed.

It is true that as a result of chronic undernourishment a certain state of adaptation is established in which the energy or caloric output is lower than normal. After a certain time, undernourishment diminishes the volume of the body until a smaller amount of food becomes sufficient to supply the body, which has become reduced in size, through loss of protein from the organs and of fats from the adipose layers. But if the supply of calories drops even farther, physiologic adaptation becomes impossible.

Rations lower than 1800 calories a day for adults produce considerable emaciation and functional disturbances of various degrees of severity

Besides containing a certain number of useful calories, different types of food have specific qualities that can in no way be supplied by other nutritive materials. To secure the normal well-being of the organism one must have a balanced ration containing minerals and vitamins as well as the indispensable minimal quantities of carbohydrates, fats and proteins. Nothing can replace these basic and indispensable elements if the living cell is to function properly.

For keeping up the energy balance of the food ration, the following proportions are customary in the countries of western civilization: 50 per cent carbohydrates, 30 per cent lipids and 15 per cent proteins. Sixty per cent of the protein should be of animal origin.

A one-sided diet causes profound physicochemical disturbances of the tissues and organs: the organism becomes incapable of maintaining the calcium of the body and the mineral balance is destroyed. This explains the bone diseases and edemas of starvation that develop with epidemic-like prevalence among those who are suffering from starvation.

Not all the proteins satisfy the needs of the organism with equal efficiency. No matter how large the supply may be, proteins of vegetable origin especially fail in this respect. Some specific needs can be supplied satisfactorily only by animal proteins on account of their higher content of essential amino acids.

Malnutrition is caused by chronic quantitative and qualitative insufficiency of the food supply. It seems necessary

to emphasize this obvious truth because of certain irresponsible opinions on the subject.

Quantitative Value of Food in Camps

The following is an example of the diet per person served to the internees in one of the camps during one month, from October 1 to 30, 1941.

	grams	*calories*
Bread	7500	17000
Fat	240	2160
Sugar	480	1960
Pumpkin*	30000	6100
Jam	2225	2250
Sardines	1800	1674
Cheese	200	600
Meat	913	911
Tripe	770	465
Carrots†	3750	1406
Cabbage†	3750	1125
		35651

*Served morning and evening for three consecutive weeks.
†Served morning and evening for one week.

This gave an average daily intake of 1188 calories, comprised as follows: protein of animal origin, 15 gm.; protein of vegetable origin, 37 gm.; fat of animal origin, 12 gm.; fat of vegetable origin, 2 gm.; and carbohydrates, 210 gm. When this record of calories was drawn up, the desiccation of the foods, which, according to competent authorities, causes a loss amounting to 15 to 20 per cent in weight, was not taken into consideration, nor was the fact that sardines, for example, contain 30 per cent of their weight as salt, nor was allowance made for the coefficient of resorption. Taking into account all these considerations, the value of the daily rations did not surpass 950 calories per person.

In another camp the quantitative value of the daily ration per person amounted to 1070 calories on February 26 and to 1092 calories on March 4. There was included in the calculation the additional food rationed out for the cachectic patients by the Commissary Department. This means that the caloric value of the actual average camp fare was about 100 calories less than the figure given. In a third camp the mean caloric value of the daily ration per person (determined by weighing) was 958 in June, 1942. In still another camp the accounts of the Commissary Department showed, on paper, daily rations of 1310 caloric value per person. But by weighing the amount of food found in the bowls of the internees, it was found that the figures were much smaller — that is, 1070 to 1109 calories, with an average of 1077 calories daily per person.

These investigations show that the quantitative value expressed in calories never exceeded 1100 calories daily per person and that it ranged between the values of 950 and 1100 calories from October, 1941, through June, 1942.

We have many documents concerning feeding in Germany and the countries invaded between 1914 and 1918. The situation in the urban communities in those years was considered critical when the daily intake of protein substances dropped to 40 to 50 gm., the daily ration of fats to 20 to 30 gm., and the supply of calories to 1400 to 1800. The average daily ration for an adult was 2232 calories (Loewy's investigation in 1916). German workers received 2200 calories during the first three years of World War I (Lusk and Codvelle's investigation). The general loss of weight was caused by the reduction in the consumption of fats.

The lowest figures, still well above those observed in the camps, were found in northern France in 1917-1918. They were 1467 calories (Lambling investigation).

Qualitative Value of Food in Camps

In the camps under supervision, the ration of protein substances does not surpass 30 to 50 gm. daily and is almost exclusively of vegetable origin; the actual daily supply of fat is 8 to 10 gm. The nitrogenous and caloric value of the rations distributed in the camps is by no means sufficient to maintain the protein equilibrium of the organism.

Instead of the normal daily ration of 1 gm. of protein per kilogram of body weight, — that is 60 gm. for a person weighing 60 kilograms, — the camp diet contained only 48 gm. of protein of vegetable origin. Furthermore, instead of the daily minimum of 24 gm. of protein of animal origin the maximum was only 15 gm. The result is a continuous deficiency in nitrogen that, even if amounting to only 9 gm. daily, represents a loss of 3300 gm. of protein a year, or a loss of 16.5 kilograms of muscles and visceral tissue for these patients.

The food supply is deficient qualitatively not only from a purely biologic point of view. Other qualitative factors, such as conditions of freshness, conservation and preparation, make the nutritional picture in the camps even worse. Besides, mass feeding does not allow special attention to individual differences or to needs of a particular state of health, and causes inevitable difficulties.

The great monotony of the diet must also be emphasized. It is well known that the ideal condition for the commencement of malnutrition is to stick to the same diet for a long time. The lack of certain vitamins in the diet is sufficient to cause, within a certain time, characteristic hypovitaminoses. This is exactly the case with the internees.

Owing to the purchase of large amounts of a single food product in season, such as cabbages, pumpkins, turnips, Jerusalem artichokes and carrots, the diet remains unchanged for long periods. The same vegetable appears on the table for many consecutive weeks. Improperly preserved, kept in stock for too long, badly prepared and floating in a disproportionate quantity of liquid, this vegetable, poor in vitamins and salts, causes various disabilities associated with hypovitaminosis. Moreover, a con-

siderable number of internees suffered for a long time or are still suffering from acute or subacute intestinal disorders. It is well known that inadequate intestinal absorption can be the cause of hypovitaminosis even if the supply of vitamins is adequate.

Nutritional Situation outside the Camps

We are indebted to the Nutrition Section of the Institute of Hygienic Research of Marseilles (operated under the auspices of the Rockefeller Foundation) for a study of the nutritional condition of the population of Marseilles. The results of the investigation given are those for October–December, 1941, since the figures obtained from more recent investigations are still unavailable. It is for this reason that figures relating to the same period in the camps were given above. Since then the situation in the camps has become aggravated entirely out of proportion to the nutritional restrictions of the people of the country in general.

Quantitative values. The usual average of calories per person daily in the groups studied among the population of Marseilles from February to September, 1941, was 1735 calories for men and women, and 1565 calories for children between the ages of twelve and nineteen. The lowest figures for a few persons with a particularly small ration were 1600 calories for men (in contrast to 2217, the highest figure obtained), 1400 calories for women (in contrast to 1741, the highest figure obtained) and 1400 calories for children between the ages of twelve and nineteen (in contrast to 2097, the highest figure obtained).

For the period October–December, 1941, the figures for all the groups studied are as follows: 1700 calories for men and women, and 1620 calories for children between the ages of twelve and nineteen. The lowest figures found in the case of some persons in particularly bad circumstances are not given, but the figures for the least favored group do not go below 1764 calories for men, 1509 calories for women and 1610 calories for children between the ages of twelve and nineteen. These records give the impression that the nutrition of the people of Marseilles is nearly down to the German nutritional standard of 1917 and in certain respects is even below it.

As regards nutrition in the camps, the rations of the average citizen of Madrid at the end of the siege during the Spanish Civil War (1937–1939) fell to 852 calories from an average of 1514 calories per person at the beginning of the siege (Grande's investigation).

Qualitative values. If the condition of the internees of the camps is compared with that of the population of Marseilles from the qualitative point of view, it is seen that the latter received a daily ration of 65 gm. of protein for the men and 55 gm. for the women. Twenty-eight per cent of this amount was a true protein — that is, 21 gm. of animal protein (October–December, 1941). What is more important, this ration succeeded that of February–September, 1941, which without doubt provided for the minimum essential nitrogen. This is not the case with the internees, who have suffered from nitrogen deficiency for the past two years.

Vitamins and Mineral Salts

The daily supply of vitamins and minerals of the internees has not been calculated in detail. Certain considerations, however, permit an evaluation of the situation. The report on the nutritional situation of the population of Marseilles makes it evident

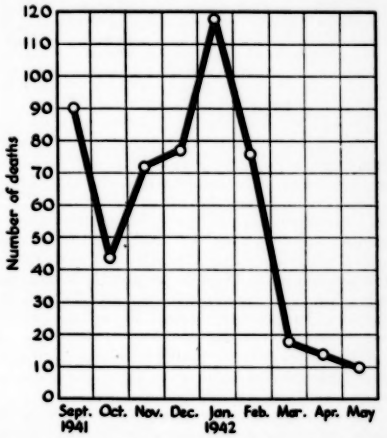

FIGURE 4. *Deaths in the Camps during the Last Nine Months.*

that there is a lack in the supply of vitamins A, B and C. It is certain, therefore, that the internees in the camps, who receive a diet much poorer in vitamins, suffer an indisputable deficiency in these biocatalysins, a deficiency aggravated by the intestinal disorders prevalent in the camps.

We shall not go into further detail on this question, which has been treated above in the section on hypovitaminosis. Similarly we shall not discuss the starvation that was revealed by the investigation in Marseilles. There was certainly sufficient calcium and phosphorus deficiency in that diet to permit similar conclusions as to the same deficiencies in the camps.

Conclusions

From these comparative studies it may be concluded: that the diet served to the internees in the camps is inferior by 40 to 50 per cent to the diet provided for the civilian population of Marseilles, which, from the point of view of food supplies, is one of the least favored cities in France; that the

prevalence of malnutrition will continue in the camps if the present ration is maintained; and that under the present conditions all effort of the relief agencies to combat malnutrition by an additional food supply and intense treatment with medicines will remain unproductive.

Critical Examination of Results

On the whole we may state that the dietary and medical treatment, started in February, 1942, and continued until the present (July, 1942), has entirely transformed the appearance and state of health of our patients. After three months' treatment one can witness real restorations to health, especially in cases of the neurologic and mental type. The atmosphere of confidence and optimism that at present pervades the barracks of the cachectic patients, formerly desolate, is deeply moving.

Since March, when efficient services and supplies were provided, cases with fatal outcome have practically disappeared from all the camps (Fig. 4). The patients gained in weight; their strength returned.

From April 16 to 30, 1942, of 100 cachectic patients in a certain camp 32 per cent showed increase in weight; in 20 per cent the weight remained stationary; in 40 per cent the patients lost weight through loss of water, and in 8 per cent there was a serious decrease (Fig. 5). Between May 1 and 15, the percentage of the gaining cachectic patients reached 60 per cent and diminished by 17 per cent in the next fortnight. Between June 1 and 15, 51 per cent of the patients gained weight, 19 per cent were stationary, and 30 per cent lost weight, the last being due almost exclusively to the disappearance of edema.

Observations in another camp show the following changes in weight: in March, 27 per cent of the patients showed decreases, 14 per cent were stationary and 60 per cent gained weight; in April, the respective figures were 18, 18 and 64 per cent; and in May, 49, 18 and 33 per cent. The results in May were much less favorable than those in the previous months, because 79 new patients (25 per cent) coming either from prisons or from the camps had to be admitted either to the hospital or to the barracks, and also, because the insufficiency of the food provided by the camp management reached catastrophic proportions during that month; the basic food was reduced to lettuce and turnips, there being no dry vegetables, potatoes, or noodles. In addition, the use of large quantities of salt fish (salted sardines) by the management caused extensive intestinal disorders, from which the patients recovered

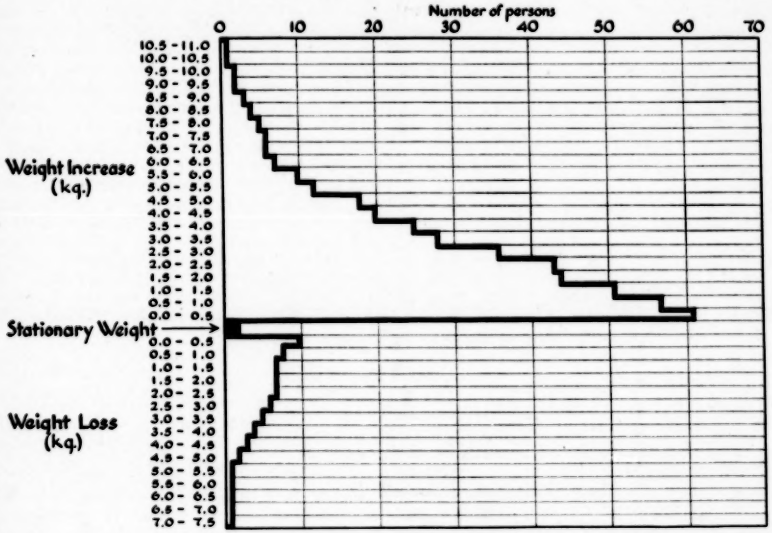

Figure 5. *Weight Changes among Cachectic Patients Supplied with Supplementary Nourishment (Camp Rivesaltes: February 27 to May 11, 1942).*

with great difficulty. Nevertheless, 37 cachectic patients (5 per cent) were able to leave the hospital after a two-month treatment and are considered to be out of danger for the time being.

This example of the harmful effect of an insufficient and unbalanced diet is not unique. The insufficiency of the usual fare in the camps should make one cautious regarding long-range prognosis. This alarming situation is evident from the progressive increase in the number of cachectic patients and in the decrease of the convalescents. Cachectic and precachectic patients sent back among the other internees relapse into their former condition, because they are exposed to the very factor that caused their disease — insufficient food. The noncachectic persons in their turn swell the number of the cases of malnutrition after exhausting their reserves and becoming more and more sensitive to the same pathogenic factor — starvation. Thus, men wrested with the greatest effort from the effects of starvation have been granted only a postponement of death.

The basic food, the daily ration furnished by the camp, remains the essential element of rescue for patients suffering from starvation, and it is up to the respective authorities to provide it.

* * *

We know that the victims of the "disease of starvation" in the camps number no more than the loss of a few companies in a skirmish, and that thousands of men fall throughout the world — innocent victims of this global war. But we know also that we have not the right to contribute to the depreciation of the value of human life. Our country will never command enough power over the spirit of man to bear the incalculable consequences of useless and unjustifiable deaths. We demand that the relief agencies continue their efforts on behalf of those interned, cost what it may. We appeal to the heartwarming sympathy of the Inspector General of the camps, who has given evidence on numerous occasions of his desire to increase the efforts intended to obtain an effective control of the sources of supply and their regular distribution to the camp subdivisions themselves. The rescue of the interned population is the prize at stake. In their name we express our deep gratitude to all our friends far and near who, by their constant evidences of sympathy, have allowed them to keep inviolate their confidence in human solidarity and their faith in a more just and generous future.

OBSERVATIONS ON THE MASSIVE-DOSE ARSENOTHERAPY OF EARLY SYPHILIS BY THE INTRAVENOUS DRIP METHOD*

IV. Three Years of Trial

LIEUTENANT BRANCH CRAIGE, JR., M.C., A.U.S.,† AND LIEUTENANT COLONEL JOSEPH F. SADUSK, JR., M.C., A.U.S.†

NEW HAVEN, CONNECTICUT

IN March, 1942, Sadusk et al.[1] reported on a series of 33 patients with early syphilis treated at the New Haven Hospital with massive-dose arsenotherapy by the intravenous drip method. It is now possible to give a further follow-up on these patients, as well as toxicologic and therapeutic observations on 40 more.

Since the introduction of massive arsenotherapy for early syphilis by Chargin, Leifer and Hyman[2] and their associates, numerous modifications of their methods have been tried. They originally demonstrated that the toxicity of a substance such as an arsenical, intravenously administered, is materially lessened if it is introduced by slow, constant drip rather than in a single large injection. Their successful therapeutic results in syphilis have stimulated many others to adopt the administration of massive arsenotherapy. A list of some of these appears in a recent review article by Reynolds, Mohr and Moore.[3] Some of these investigators, however, have used drugs that are more toxic than the recommended Mapharsen (meta-amino-para-hydroxy-phenylarsine-oxide hydrochloride), and some have discounted the rationale behind the slow administration of the drug and have administered large doses by the multiple-syringe method. Toxic reactions encountered with the use of neoarsphenamine or the multiple-syringe technic should not reflect on the value of the constant-drip method with Mapharsen.

TECHNIC

Studies of the patients in this series were made to establish a definite diagnosis of early syphilis and to exclude patients with serious complicating disease. The diseases considered contraindications to massive arsenotherapy were liver disease and severe nephritis — the former because arsenicals are taken up and stored mainly in the liver, and the latter because a rare case of renal damage has been reported.[4] Gonorrhea is not a contraindication, and 1 of our patients had early tuberculosis and another mitral stenosis and an old hemiplegia. Routine studies in-

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cluded a blood-cell count, serologic examination, urinalysis, nonprotein nitrogen determinations, an electrocardiogram and x-ray examination of the chest. Renal studies were made if nephritis was suspected from the urinalysis, and liver-function tests were made in alcoholic patients.

The actual administration of the drug was relatively simple. Solutions were made up twice daily — 1200 cc. of 5 per cent glucose in a Fenwall flask with 120 mg. of Mapharsen. A strip of adhesive plaster on the side of the flask was marked with the levels at which the fluid in the flask should be at various hours. The rate of flow was regulated with reference to the marks, and the more intelligent patients were often able to watch the clock and help regulate the flow themselves. Thus two flasks (2400 cc. with 240 mg. of Mapharsen) were administered daily over a period of twelve hours for five days, making a total for each patient of 1.2 gm. of Mapharsen. At the conclusion of the period, the blood-cell count, urinalysis, nonprotein nitrogen determination and electrocardiogram were repeated and a lumbar puncture was performed.

Follow-up observations were made, when possible, at monthly intervals for six months, and at three-month or six-month intervals thereafter. When possible, another lumbar puncture was performed after several months. The co-operation of local and state health officers in helping to bring patients back for follow-up tests has been of great value.

Table 1 classifies the patients in the series. For the purpose of studying the toxicologic phenomena it is convenient to note that there are eighty treatment courses, whereas for evaluating the therapeutic results there are 74 patients, inasmuch as 7 patients were treated twice and 1 of these having a proved reinfection was counted as 2 patients. His case history was previously reported in detail.[1]

Table 1. *Clinical Data.*

Data	No. of Cases
Sex:	
Male	38
Female	36
Race:	
White	43
Negro	31
Age distribution:	
15–19 years	9
20–29 years	50
30–39 years	11
40–49 years	3
50 years or older	1
Stage of syphilis:	
Primary (negative serologic reaction)	5
Primary (positive serologic reaction)	19
Secondary	44
Infectious relapse*	1
Early latient	5
Diagnosis at time of re-treatment:	
Infectious relapse (serologically fast)	1
Serologic relapse	1
Serologically fast	4
Reinfection	1

*Previous routine therapy.

Nineteen patients had had previous antisyphilitic therapy, either bismuth or an arsenical, but in no case had more than two routine injections been given. One patient was inadvertently given several weeks of routine therapy elsewhere after leaving our observation. Another had a single injection of bismuth.

Toxicology

The toxicologic data are summarized in Table 2. Primary fever (Herxheimer reaction) occurred in many of the patients, sometimes with a shaking chill.

Table 2. *Toxic Phenomena in Eighty Courses of Treatment.*

Reactions		No. of Cases
Benign:		
Primary fever (Herxheimer reaction), temperature 101°F. or higher		27
Secondary fever (drug fever), temperature 101°F. or higher		24
Toxicoderma (drug rash), without fever in 8 cases		17
Vomiting		58
Males (41 cases)	23	
Females (39 cases)	35	
Local venous thromboses		24
Leukopenia (without neutropenia)		2
Electrocardiographic changes (67 cases)		56
Secondary anemia (40 cases)		19
Peripheral neuritis 3 weeks after treatment (59 cases)		30
Paresthesias only	23	
With hypesthesia	2	
With loss of Achilles reflex and hypesthesia	5	
Serious:		
Peripheral neuritis with temporary paralysis		1
Jaundice (same patient as above)		1
Nitritoid crisis		0
Nephritis		0
Cerebral symptoms		0
Hemorrhagic encephalitis		0
Blood dyscrasia		0
Exfoliative dermatitis		0
Fatality		0

It was often accompanied by a macular eruption, especially in the late primary and secondary cases. It usually appeared six or eight hours after the beginning of treatment and subsided a few hours later. In no case was treatment interrupted because of this reaction.

Secondary fever (drug fever), with or without a cutaneous eruption, appeared in many of the cases on the fourth to the sixth day after the beginning of treatment. In 1 case a shaking chill occurred with the fever. Like the Herxheimer reaction, these symptoms disappeared without treatment. The rash was fairly uniformly a fine maculopapular, brightly erythematous eruption of generalized distribution. It was not hemorrhagic, and exfoliation did not occur. Only rarely did pruritus accompany it.

Vomiting occurred in most cases, being a prominent symptom on the afternoon of the first day. As previously pointed out,[1] it was more frequent and of greater severity in women than in men.

Most patients complained of some pain along the course of the vein receiving the infusion. Usually this pain could be satisfactorily controlled with small doses of codeine. Thrombosis of one or more of the veins occurred often but aside from local tenderness led to no difficulty. In most cases recanalization in these veins took place during subsequent weeks.

Leukopenia was a rare occurrence and was not accompanied by granulocytopenia. A mild secondary anemia was frequently noted during the follow-up period. In most patients no symptoms were referable to the anemia, which subsided without therapy.

Some noted a feeling of tiredness or weakness for two or three weeks.

Electrocardiographic changes[5] consisted of diminution of the amplitude of the T waves in any or all leads. If the T waves were low at the beginning of therapy, inversion frequently occurred. Such changes disappeared during the first three weeks of the follow-up period, and during the second course of treatment; there was significant depression in only 1 of 3 patients.

During the second or third week after completion of treatment, evidence of peripheral neuritis was noted in nearly half the patients. In most of them it amounted only to numbness and tingling of the toes or rarely of the fingers. This subsided in a few days. A few patients also had definite stocking-type hypesthesia to pinprick. Some, in addition, lost the ankle jerk.

All the above phenomena are considered to be fairly benign accompaniments of treatment. Some are annoying and some cause pain or distress, but none represent cause for alarm.

Of the more serious toxic phenomena, only motor neuritis and jaundice have occurred in this series, and in only 1 case. This patient recovered. Treatment in her case probably represented an error in judgment, since it is likely that she had hepatitis before treatment and was consequently unable to excrete the large doses of Mapharsen. It is for this reason that we hesitate to administer the treatment to any patient with fever unless liver disease can be excluded by appropriate tests.

No patient has had a nitritoid crisis, nephritis, cerebral symptoms, hemorrhagic encephalitis or exfoliative dermatitis, and there have been no fatalities.

Therapeutic Effects

The local primary and secondary lesions became negative on dark-field examination within twenty-four hours from the beginning of treatment. Before the five days were completed there was usually clear evidence of epithelialization and shrinking of the chancre or condyloma. Skin rashes faded more slowly if pigmentation had occurred.

Reversion of the serologic reaction to negative usually occurred during the first six months following therapy, and in most cases between the tenth and twentieth weeks, as shown in Figure 1, which records the rate of reversal in 48 cases in which there has been time for them to become seronegative. In interpreting this figure it should be recalled that in most cases observations were made not oftener than once a month and that, therefore, the elapsed time shown tends to be longer than the actual time of reversal.

In the total series of 74 cases, in which, as stated, 1 patient who was reinfected and treated twice was counted as 2 patients, 36 have been followed for less than six months (Table 3). Five of these when treated had primary syphilis with a positive dark-field and a seronegative reaction. These 5 patients, and 12 who were originally seropositive, were seronegative when last seen. Two have had doubtful reaction and 17 are still seropositive, but they must be observed longer before it can be determined whether one course of treatment will cause reversal of the serologic reaction.

There remain 38 patients who have been observed for more than six months (Table 3). Thirty of these became seronegative after one course of

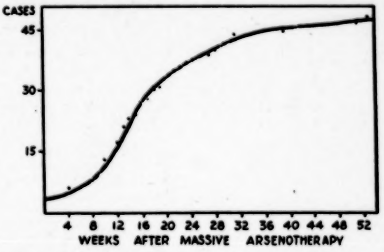

Figure 1. *Time of Reversal of the Serologic Reaction. This chart includes the 48 patients whose serologic reactions became or remained negative after one course of treatment. The curve indicates the cumulative number of seronegative patients at various times during the first year of observation after the administration of massive arsenotherapy.*

massive arsenotherapy and have remained so to date. One additional patient became seronegative but relapsed. Seven remained seropositive. The patient who relapsed and 5 of the 7 who remained seropositive, as well as the patient who was reinfected, were given a second course of massive arsenotherapy. The diagnoses at the time of re-treatment are listed in Table 1. Re-treatment is customarily recommended if the serologic tests remain positive after six months of observation or if a relapse or reinfection has occurred.

Following the second course of treatment, both the patient who was reinfected and the one showing a serologic relapse became seronegative. Of the 5 re-treated patients who remained seropositive after the first treatment, 1 has remained seropositive for more than six months after the second treatment and represents an unquestioned serologic failure; 2 are now seronegative, and 2 have not been followed long enough after the second course to determine whether re-treatment will be successful. Two of the 7 patients who remained seropositive after the first treatment have not yet been re-treated. There remain, therefore, 5 of the 38 who have been followed more than six months who are still seropositive, whereas 33 are now seronegative. It should be emphasized, however, that of these 5 patients none show clinical evidence of syphilis and 4 have had

negative spinal-fluid Wassermann reactions. One has had a positive or doubtful spinal-fluid reaction — a twenty-one-year-old seropositive man who had a chancre and a positive dark-field test. Thirty-six weeks after massive arsenotherapy the spinal-fluid Wassermann reaction was negative. Because the patient remained seropositive, however, he received a second course of massive arsenotherapy after fifty-nine weeks. At seventy-one weeks, when he was still seropositive, the spinal fluid gave a positive

limited to the 1 patient with jaundice, severe anemia and motor weakness, who recovered.

This method is not a cure-all for syphilis. We have attempted its use in no patient with latent syphilis unless the secondary eruption was known to have recently been present. Consequently we have no experience in its use in late syphilis. In early syphilis its therapeutic effects as presented above are probably comparable to those obtained with a year and a half's uninterrupted weekly injections by the alter-

TABLE 3. *Therapeutic Results.*

Duration of Follow-up	Latest Serologic Reaction			Follow-up Spinal-Fluid Examination			Other Signs of Syphilis
	No. of cases	Positive	Negative	No. of cases	Positive	Negative	
Less than 6 months*	36	19	17	7	0	7	0
More than 6 months†:	38	5	33	31	1	30	0
Treated once	32	2	30	25	0	25	0
Treated twice	6	3	3	6	1	5	0
Totals	74	24	50	38	1	37	0

*Includes 5 seronegative primary cases, 1 of which became temporarily seropositive immediately after treatment.
†Includes 27 cases followed for more than 1 year.

Wassermann reaction in two laboratories and a negative one in a third. The globulin test was negative, the colloidal-gold curve was 0000000000, and the spinal fluid showed 11 lymphocytes per cubic millimeter.

The spinal fluid was examined at the time of treatment in 61 cases, and in 58 of these the Wassermann reaction was negative. In 3 cases it was positive at the beginning of treatment, and in 2 of these it

nating block method. One advantage, of course, lies in the fact that every patient completes a full course of treatment, whereas in patients with early syphilis who enter a course of a year and a half's weekly injections, not more than 16 per cent actually receive an adequate minimal course of therapy as defined by the United States Public Health Service.[7] A second advantage is that the patient is kept in the hospital while infectious and that when he is

TABLE 4. *Results in Cases of Pregnancy.*

Name	Date of Treatment	Additional Antisyphilitic Treatment	Condition of Placenta	Condition of Baby					
				Cord blood		Venous blood		X-ray exam. of bones	Physical examination
				Kahn	Wass.	Kahn	Wass.		
B. B.	7 wk. before conception	0	Normal	0	0	0	0	Normal	Normal
I. R.	13 wk. before conception	0	Normal	0	0	0	0	Normal	Normal
M. G.	5 wk. after conception	0	Normal	0	+	0	0	Normal	Normal
R. S.	6 mo. after conception	0	Normal						Baby premature*
I. W.	2 mo. after conception	0	Normal	0	0	0	0	Normal	Normal

*Baby weighed 3 pounds, 4 ounces, and died shortly after delivery.

subsequently became negative. The third patient has not had a second lumbar puncture. In 38 cases the spinal fluid was examined during the follow-up period, usually after six months but sometimes earlier. In every case except the one mentioned above, the follow-up spinal-fluid Wassermann reaction was negative (Table 3).

Table 4 shows the results of pregnancy in several cases.[6]

Discussion

It is apparent from the foregoing data that minor discomforts and inconveniences during and immediately after a course of massive arsenotherapy by the continuous-drip method are frequent. Serious toxic phenomena were rare in this small series, being

returned to the community he is, and almost invariably remains, noninfectious.

The cost of massive arsenotherapy by the intravenous drip method varies in different communities. Many of the diagnostic procedures we have done are probably unnecessary except for research purposes. The following steps appear to be essential, and from this list the cost may be calculated: seven to ten days of hospitalization (those who have secondary fever remain a little longer than the others); physician's history, examination and observation; at least two serologic tests; a dark-field examination, a blood-cell count, two urinalyses and, occasionally, a nonprotein nitrogen determination and a bromsulfalein, cephalin-flocculation or other liver-function test; materials for infusion (5 per cent

glucose, Mapharsen and equipment); facilities for obtaining serologic tests, preferably once a month for six months and less often thereafter; and lumbar puncture after six months.

Summary

Massive arsenotherapy for early syphilis has not as yet in our limited experience proved hazardous, and presents no great difficulties in administration. The cardinal points to be observed are as follows: establishment of the diagnosis of early syphilis; exclusion of patients with fever, liver disease or severe nephritis; and periodic follow-up visits with determination of whether re-treatment is necessary on the basis of the serologic reaction six months later, or of relapse at an earlier date.

Its virtue lies in the facts that every patient receives an amount of treatment that has been found sufficient for cure in four fifths of the patients; that completion of a minimum adequate amount of treatment does not depend on the patient's returning; and that when the patient leaves the hospital he is noninfectious and in almost every case remains so. Its disadvantage lies in the danger of an occasional severe toxic reaction that may rarely be fatal.

Using massive arsenotherapy by the five-day continuous intravenous drip method satisfactory results were obtained in 79 per cent of the cases observed six months or more. By re-treating selected cases, the total of satisfactory results has been raised to 87 per cent. Of the remaining 13 per cent, some patients have not been observed long enough after re-treatment to ascertain the final result. Except for a positive spinal-fluid reaction in 1 case, the only evidence of syphilis in these cases is the positive serologic reaction.

References

1. Sadusk, J. F., Jr., Craige, B., Jr., Brookens, N., Poole, A. K., and Strauss, M. J. Observations on massive dose arsenotherapy of early syphilis by intravenous drip method. I. Toxicology, clinical observations and therapeutic results. *Yale J. Biol. & Med.* 14: 333-355, 1942.
2. Chargin, L., Leifer, W., and Hyman, H. T. Studies of velocity and response to intravenous injections. V. Application of intravenous drip method to chemotherapy as illustrated by massive doses of arsphenamine in treatment of early syphilis. *J. A. M. A.* 104: 878-883, 1935.
3. Reynolds, F. W., Mohr, C. F., and Moore, J. E. Syphilis: review of recent literature. *Arch. Int. Med.* 70:836-915, 1942.
4. Rattner, H., and Falk, A. B. Severe arsenical reaction encountered in five day treatment for early syphilis. *J. A. M. A.* 118:1368, 1942.
5. Geiger, A. J., Craige, B., Jr., and Sadusk, J. F., Jr. Observations on massive dose arsenotherapy of early syphilis by intravenous drip method. II. Electrocardiographic abnormalities associated with massive arsenotherapy. *Yale J. Biol. & Med.* 14:357-363, 1942.
6. Sadusk, J. F., Jr., and Shaffer, T. E. Observations on massive dose arsenotherapy of early syphilis by intravenous drip method. III. Pregnancy and its outcome, associated with or following treatment of early syphilis by massive arsenotherapy. *Yale J. Biol. & Med.* 14: 365-371, 1942.
7. Hyman, H. T. Critical evaluation of results of routine conservative treatment of syphilis. *Bull. New York Acad. Med.* 17:467-482, 1941.

MEDICAL PROGRESS

PHYSICAL THERAPY IN GENERAL MEDICAL PRACTICE*

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IN PREVIOUS reports on physical therapy there have appeared general reviews and summaries limited to the application of physical measures in the treatment of diseases of the nervous system and conditions commonly encountered in surgical practice.[1-4] The present addition to the series is restricted to a review of the recent literature relating to the physical-therapy procedures found to be of value in general medical practice.

Neurologists, surgeons and particularly orthopedists have long recognized the value of physical therapy in dealing with conditions affecting locomotion, but the internist has less frequently understood and employed these methods. As explained by Piersol,[5, 6] this is due to lack of adequate medical education in this field and insufficient training to develop skill in application. The public, however, has remained aware of the benefits of physical treatment and often seeks it from nonmedical sources when denied it by physicians. Those procedures, therefore, that the general practitioner should find useful will be described in relation to their employment in the treatment of common disorders of the various systems of the body.

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Chronic Arthritis and Allied Disorders

Rheumatoid arthritis is the outstanding example of a medical condition in which the proper use of physical measures is of value. In fact, Short and Bauer[7] state that physical therapy cannot be dispensed with in the treatment of this disease. They further assert that "general measures — including rest of the whole patient and of the joints, along with an attempt to preserve, so far as possible, the function of the articulations and muscles — form the backbone of the treatment of rheumatoid arthritis." At the Robert Breck Brigham Hospital training in body mechanics has been emphasized as being of prime importance in combating the

tendency toward joint deformities and in lessening the strain on damaged joints.[8] Postural exercises are at first taught in the supine position. They include deep breathing, rib stretching, contraction of the abdominal and gluteal muscles or the so-called "pelvic tilt." Later, when more activity is allowed, exercises in sitting and standing positions are performed and the proper mechanics of walking are taught.

In order to improve individual joint function, a combination of physical measures are indicated, including thermotherapy, massage, splintage and exercise. Heat is used to increase local circulation, lessen sensitivity and aid in muscular relaxation before exercise.[9] Radiant-heat cradles or bakers with four 60-watt or 120-watt bulbs may be used, or for home use a single 250-watt clamp lamp, and 500-watt or 1000-watt units in hospitals.[10] Treatments should last from thirty to forty minutes and be given once or twice daily. Moist heat may be applied in the form of hot fomentations. Melted paraffin wax baths are an especially effective method of applying heat to the extremities.[11] These baths consist of a mixture of 7 parts paraffin wax to 1 part paraffin oil, which is kept at the melting point (approximately 125°F.) in a double boiler or an electrically heated unit. The extremity is immersed and quickly removed six to eight times until a coating of wax is formed like a glove, after which it may remain in the bath for twenty to thirty minutes. After the treatment the wax easily peels off and may be used again. Warm whirlpool baths in addition to heating effects also provide mild stimulative massage and an opportunity for underwater exercise. Large Hubbard tubs allowing movement of the shoulders and hips under water are extremely valuable, although of course available only as hospital installations. Therapeutic pools may also be utilized to advantage by arthritic patients, particularly when beginning to walk. In the home a daily hot bath or shower is often of value. A safe bath temperature to begin with is 100°F., which may be increased as tolerated. The length of the bath may be gradually increased up to thirty minutes. In an occasional patient, contrast baths appear to give more relief of pain than does the use of heat alone. In this procedure the temperature of the hot water is 100 to 110°F. and that of the cold 60 to 65°F. Seven alternate immersions are recommended, with five minutes in the hot bath and two in the cool, always starting and finishing in the hot bath.[9] Diathermy may occasionally be employed, particularly for hospitalized patients, but simpler methods that can be used repeatedly with little expense are usually more suitable. Electric heating pads are used extensively by patients, although they frequently become too hot and may cause burns.

Iontophoresis, using drugs such as Mecholyl or histamine, is often useful in securing a hyperemia that is somewhat more persistent than that following heat, but this is not recommended as a routine procedure.[12–14]

General ultraviolet irradiation in mild, graduated doses may act as a stimulant to appetite and a sense of well-being, but has no known specific effect on the disease. Controlled heliotherapy may be administered for the same purpose, with avoidance of overexposure.[7]

Fever therapy is often of benefit in selected cases.[15] Krusen[9] has recommended short sessions of about thirty minutes at 101°F. Fever may be produced by use of a fever cabinet or by a full tub bath at a temperature of 98 to 105°F.

Massage is a useful and often neglected procedure that aims to increase local circulation and improve muscle tone. It may advantageously follow thermal applications and precede therapeutic exercises. As a rule only gentle stroking and kneading motions are to be used and direct movements over the joints are avoided, particularly during the stage of acute inflammation.[16]

Therapeutic exercises are the most important single physical measure used to improve joint function, although most effective when combined with heat and massage. The active co-operation of the patient is essential for obtaining satisfactory results in mobilizing joints and maintaining musculature. During the early acute stages of inflammation, static or muscle-setting exercises only are used. Active exercises are then carefully graded in intensity; at first they may consist of active assisted motions, and later of voluntary exercise. Resisted exercises are rarely indicated because of the tendency toward subluxation. Passive stretching or manipulation to increase the range of joint movement is also dangerous. Under careful supervision the patient can usually be taught how to stretch the joints actively in correct positions and how to judge the forcefulness of the efforts according to the degree of subsequent reaction, which when consisting of pain or muscle spasm should not last more than an hour or two. The specific joint exercises are to be repeated by the patient on an average three times each day and must be checked by the technician every day at first, and less often when the routine is well learned.

In many cases of rheumatoid arthritis, deformities of joints are present that require special orthopedic attention for correction. The commonest of these are flexion contractures of the knees and hips and the characteristic combination of flexion, hyperextension and ulnar-deviation deformities of the hands. Traction, specially designed splints or a progressive series of casts have been described for correction and prevention of these deformities.[17, 18] It is particularly important whenever any immobilizing apparatus is used in these cases that periods of carefully administered physical therapy be provided to prevent ankylosis. The details of the combination of orthopedic and physical therapeutic

measures have been well described by Kuhns[19] in his section of Steinbrocker's textbook on arthritis.

Since rheumatoid arthritis has a well-known tendency to chronicity, physical measures that can be utilized in the home repeatedly each day are to be recommended. Recently Treusch and Krusen[20] reported a survey of home physical therapy in 229 cases of arthritis, and found that 93 per cent of the patients followed the instructions for home therapy and 65 per cent continued them for three months or longer. They observed that patients with more than one course of instruction were more likely to carry on. Four fifths of the patients were definitely benefited, and two fifths were enthusiastic over the regime.

In hospitals, occupational therapists may assist in the instruction and supervision of patients in exercises or activities designed to improve joint range and muscular strength. This functional type of occupational therapy may be advantageously co-ordinated with physical-therapy treatments. Such co-ordination is best achieved when the physical and occupational therapy departments are directed by a physician specializing in physical medicine.[21]

Physical therapy is of definite value in the treatment of degenerative joint disease or hypertrophic arthritis (osteoarthritis). Moderate heat applied locally and repeated several times daily is effective in relieving pain.[22] The methods previously described are satisfactory. Gentle sedative massage, chiefly stroking and light kneading, assists in reducing muscle spasm and pain. Rest of painful joints during the presence of acute symptoms is usually indicated,[23] but is not so prolonged as in rheumatoid arthritis, for the pathologic changes are in the nature of degeneration or aging processes rather than progressive inflammation.[24] It is important to maintain the supporting musculature by means of graded active exercises without weight-bearing or resistance, thus avoiding further traumatic effects on the joints. Teaching the principles of correct body mechanics is of prime importance in order to relieve weight-bearing joints of unnecessary strain. Elderly patients with degenerative disease of the joints are frequently found to have osteoporosis of the spine and disabling pain. Black, Ghormley and Camp[25] have reviewed a small series of these cases and discuss the differential diagnosis and possible etiologic factors. They recommend the administration of an adequate diet together with additional calcium and phosphorus and vitamin D. For relief of pain short periods of bed rest and local heat followed by sedative massage were found to be effective.

The role of physical therapy in the treatment of infectious arthritis is secondary to the specific measures available.[26] In tuberculous arthritis, healing of the local lesion is generally achieved only by ankylosis, so that heat, massage and exercise are contraindicated. General heliotherapy is, however, of recognized value in curing the disease process systemically, when used in conjunction with rest and hygienic management, particularly in a sanatorium. Artificial sources of ultraviolet radiation may be used if the climate does not permit direct exposure to the sun. Overdosage must be especially guarded against, and in the presence of active progressive pulmonary lesions all irradiation may have to be omitted.[27]

Gonorrheal arthritis usually responds well to sulfonamide medication or penicillin. In drug-resistant cases good results from combined drug and fever therapy are reported.[28, 29] The management of artificial fever requires exact technic and experienced personnel. Hospitalization is essential, and the technics to be used are well established.[30] The joints that are acutely inflamed are kept at rest, and no attempts at mobilization are begun until the inflammatory process has subsided. At that time mild heat to improve the circulation and graded active exercise usually suffice to restore full joint function in those cases that are promptly and adequately treated medically. In other types of septic arthritis the end results are dependent on control of the infection by the chemotherapeutic measures available, together with surgical drainage in some cases. Physical therapy aids in overcoming the limitation of motion secondary to immobilization and is begun only after subsidence of the septic process. There may be danger in beginning mobilization too early in these cases because the action of the chemotherapeutic agent may mask the degree of inflammation still present.

Hemophilic arthritis associated with an acute hemarthrosis is often very painful and destructive. These joints should be treated by immobilization, physical therapy being ordered only when the bleeding has stopped and the acute inflammatory reaction has subsided.[26] Gentle effleurage and adequate assisted active exercise may then be begun, passive stretching or manipulation being avoided.

Anaphylactic arthritis occurs as a manifestation of serum sickness, and as it is self-limited rarely requires any physical therapy other than heat for relief of pain. Neuritis is a somewhat uncommon complication of serum sickness, but may result in paralysis and atrophy of one or more of the shoulder-girdle muscles, particularly the deltoid, trapezius and serratus magnus.[31] Although the prognosis for eventual recovery in these cases is good, there is a period of six to twelve months of limited shoulder function and pain during which the patients may be benefited by physical therapy. Mild heat and sedative massage are administered for relief of pain and muscle spasm of the surrounding musculature, which is subjected to unusual strain in moving a partially paralyzed extremity, and the atrophied muscles are benefited by electrical stimulation to lessen the degree of wasting and to hasten functional return after neural regeneration.[32]

Another type of cervicobrachial neuritis may result from neurocirculatory compression in patients with a tight or spastic scalenus anticus muscle. According to Spurling and Grantham,[33] about 75 per cent of these patients with painful arms and shoulders improve or become asymptomatic after conservative treatment. Hansson[34] is of the same opinion and had described in detail corrective postural exercises for the neck and shoulder-girdle musculature. Local application of heat over the scalenus muscle and sedative massage are also advised.

Radicular type of pain in the same location may be associated with osteoarthritis of the cervical portion of the spinal column.[35] According to McFarland and Krusen,[36] traction with the Sayre head sling usually gives relief. They advocate radiant heat and massage prior to the traction, which is given in the sitting position with a slowly increasing force up to 70 pounds, as tolerated. The head is then slowly rotated and the traction gradually released. Treatments are repeated twice daily for a week or more.

Myalgia of the cervical muscles is another fairly common condition that responds to treatment by physical agents.[37] This is sometimes described as an "indurative" headache or as cervical fibromyositis. Minor epidemics have been reported from England and in the armed forces.[38–40] The etiologic factors are not clear. The predisposing factors include occupational strain or poor posture, resulting in fixation of the head and neck in abnormal alignment, vasomotor imbalance and exposure to cold and drafts. In many cases hypersensitive areas are found in muscles and in palpable thickening or localized areas of muscle spasm.[41] Copeman[42] in a discussion on the etiology of these so-called "fibrositic nodules" observed that they may appear in the course of infectious diseases such as influenza and may be reactivated by exposure to cold or by trauma and subsequent sepsis and may form the basis of rheumatic syndromes in later life. Treatment of these patients is often highly dramatic in its results. In some patients with acute stiff neck, complete relief is obtained by fifteen minutes of head traction. Other patients respond as readily to local application of heat with infrared radiation or diathermy, followed by stimulation of the muscles in spasm with a sinusoidal current. For patients with more persistent symptoms, Krusen has described the physical therapeusis of fibrositis.[43] Procedures to be used are local heat, special friction massage and stretching exercises. The patients are frequently neglected by physicians unacquainted with the procedures of physical medicine, and they turn to the osteopath or chiropractor for relief that could be obtained by recognized methods of treatment. Manipulation of joints is likewise for the most part neglected by the medical profession, chiefly because of the exaggerated claims made by bone setters and others, based on erroneous diagnosis and unscientific analysis of results. Recently Fredette[44] has presented the indications and contraindications to manipulation and has described the technic of the maneuvers and the aftercare of patients. Intelligently and skillfully used on properly selected patients, manipulation has a definite role as a procedure in medical therapeusis.

The diagnosis and treatment of patients with complaints of backache and painful feet is a difficult and important subject, particularly in the armed forces and among civilians now leading a more active life than customarily. Orthopedic surgeons are usually called on to care for these patients, and the details of methods used in differential diagnosis and in treatment are beyond the scope of this paper. The internist should, however, be familiar with the management of patients with chronic postural strain, which is the commonest cause of backache.[45] In these cases physical therapy is of cardinal importance, as has been pointed out by Krusen.[46] Local application of heat, skillfully administered massage and postural and corrective exercises alleviate symptoms in a large percentage of cases, and Jostes[47] has shown how manipulation may be of value. Nutt[48] has written an excellent article on painful feet, outlining for the practicing physician the anatomy of the foot with reference to proper bony and muscular alignment and the prevention and treatment of the common varieties of foot complaints. Other articles dealing more with physical therapy in these conditions have appeared.[49, 50]

Diseases of Blood-Forming Organs

Ultraviolet rays are the chief physical agent reported as having a favorable influence on some types of anemia. In secondary anemia this effect is limited, nonspecific and far less efficient than are dietetic and drug treatments.[27] A few cases of thrombocytopenic purpura have been improved by carbon-arc radiation.[51] Apperly[52] has noted an apparent relation between solar radiation and pernicious anemia, finding that the mortality of this disease is inversely proportional to the effective radiation. Peripheral neuritis[53] or combined-system disease as a complication of pernicious anemia often requires prolonged periods of muscle re-education, in addition to adequate replacement therapy during rehabilitation.[3]

The influence of ultraviolet irradiation on resistance to infection is controversial and doubtful. Some beneficial action on wound healing has been shown by exposure to solar radiation, including ultraviolet, visible and infrared wave lengths.[54]

Endocrine and Metabolic Disorders

In a limited number of cases physical therapy is of value in diseases of the endocrine glands and in disorders of metabolism. Gout because of its interference with joint function is a disease in which some symptomatic relief may be obtained by physi-

cal means. During the acute attack, rest is essential, and the pain may be diminished by use of hot compresses or in other cases with cold applications.[55] In the intervals between attacks and during recovery from the acute episodes, mild heat and graduated exercises to maintain and improve musculature are of value. Medicinal therapy is of the greatest importance, and several recent reviews[55, 56] have adequately discussed it.

Exercise is known to improve the sugar tolerance of diabetic patients when participated in to the proper degree. According to Drury et al.,[57] experimental studies have shown that heavy exercise reduces the ketosis in guinea pigs and man. The help of a physical therapist, however, is usually not needed in supervising exercise for diabetic patients. Neuritis may be an extremely painful complication of diabetes; these patients are benefited by local hot applications or radiant heat. In the event of pronounced muscular weakness, muscle re-education in the form of specific strengthening exercises may be indicated.[3]

Obese patients are frequently referred to physical-therapy departments for measures to reduce weight. Passive procedures such as massage or vibration, although popular with the laity, do not remove fat deposits. Dietotherapy is of fundamental importance, but often exercise is prescribed in addition, to increase the caloric requirements of the body at the same time avoiding if possible increase of appetite. Heat treatments, such as cabinet baths or steam baths, temporarily reduce weight through dehydration but are not of permanent value. Cawadias[58] maintains, however, that obesity is often not controlled by thermodynamic considerations alone, and recommends that the psychologic reactions of the patient be taken into account. He believes that a combination of therapeutic procedures, including so-called "tonic dosage" of ultraviolet rays or hydrotherapy aimed at improving the psychologic balance, is most satisfactory.

Billig[59] suggests that dysmenorrhea may be secondary to tightness of ligamentous structures concerned with pelvic motion in patients with postural defects. The cyclic nature of the pain is explained by restrictions of the posterior pelvic tilt, dependent on the estrogenic level. He has found that specific stretching exercises are curative in these cases.

Although some experimental studies have indicated that estrus is influenced by artificial illumination in animals,[60] little is known at present of practical importance concerning physical agents in the treatment of other endocrine disorders.

Pulmonary Disease

Short-wave diathermy is used at times as an adjunct in the treatment of acute or chronic bronchitis and in pneumonia, but in view of modern chemotherapy it seems to have a very minor role. Symptomatic relief of pleuritic pain has, however, been reported.[61] Its possible usefulness in the treatment of atypical or virus pneumonia is worthy of investigation. Special breathing exercises are of value in relieving dyspnea in asthma,[62] and preliminary reports indicate favorable results with ultraviolet blood irradiation and with artificial-fever therapy.[63, 64] Reports have been made of successful treatment of pulmonary abscess by short-wave diathermy, but its real worth is doubtful.[65] Postural exercises are, however, of value in the prevention and treatment of scoliosis secondary to lung abscess, empyema and thoracoplasty.[66] In uncomplicated pulmonary tuberculosis, heliotherapy is indicated only after prolonged treatment with rest and hygienic and dietetic treatment, and never in the exudative type. Exposure is carefully graded in the early morning and late afternoon.[27] Extrapulmonary complications, however, are favorably affected. Graded exercises and occupational therapy have also a definite place in the convalescence of patients with tuberculosis.[67, 68]

Heart Disease

The rehabilitation of many cardiac patients may be facilitated by suitable physical therapy. Parsons-Smith[69] has described the principles involved and methods to be used. He states that the value of exercise in these patients is based on the improvement of myocardial efficiency from increased stroke volume and venous return. The exercise must be suitable, frequently in the form of occupational therapy. Light general massage may precede exercises, which are at first passive and limited to the large joints, with graduation to resistive exercises, walking[70] and games or activities. The general rules are as follows: no extensive, sudden or prolonged exertion of muscle groups should be allowed; undue exposure or athletic tests should be avoided; exercise should be regulated according to the patient's tolerance; and a suitable occupation in view of the cardiac reserve and the patient's natural inclinations should be found.

Disabilities of the shoulder or hand may occur as a complication of coronary occlusion. Askey[71] believes that this is due to a disturbance of the sympathetic nerves from myocardial ischemia together with an underlying latent arthritis. In his experience the condition was self-limited and treatment was of little avail, although massage was sometimes beneficial. Johnson[72] has reported changes resembling sclerodactylia following myocardial infarction, and Kehl[73] noted Dupuytren's contractures as a sequel to disease of the coronary arteries. These authors also think that the etiologic factor is related to irritation of the sympathetic nervous system and noted little benefit from the usual physical-therapy procedures.

Smith and Kountz[74] observed 15 patients with anginoid pain of a character suggesting heart disease but actually due to deformities of the

thoracic spine. Postural correction by therapeutic exercise was found to lead to improvement or cure of the symptoms.

Diseases of Eye, Ear, Nose and Throat

Otolaryngologists frequently recommend the use of physical-therapy procedures in the treatment of infections of the sinuses, ears and upper respiratory passages,[75] and a textbook has been devoted to this single aspect of therapy.[76] In uncomplicated acute upper respiratory infections, especially with involvment of the sinuses, applications of heat are at least of symptomatic value. Infrared generators or short-wave diathermy may be used in conjunction with rest, vasoconstrictors and chemotherapy.[77] It has been pointed out by Brighton, Snow and Friedman,[78] however, that short-wave therapy should not be considered in any sense a specific curative agent. They found that it was most beneficial in relief of headache in chronic nonpurulent sinusitis. Teed and Kraus[79] have studied the problem of dosimetry in ultra high-frequency diathermy and have described an instrument that can be used to measure the dosage of energy applied to the sinuses, whereas in the usual application the technician must be guided almost entirely by the subjective response of the patient.

Williams and Elkins[80] have described a syndrome that they designate as "myalgia of the pharynx." This is characterized by chronic sore throat, pain on swallowing and occasional attacks of hoarseness, without inflammation of the mucous membranes of the upper respiratory tract. The diagnosis is made by finding on palpation points of tenderness localized in the pharyngeal and laryngeal musculature. These writers comment on possible etiologic factors and recommend certain physical-therapy procedures in treatment. These consist in the use of local heat in the form of short infrared irradiation, diathermy and hot fomentations. Massage, however, is the most effective single agent in treatment and is of a heavy-friction type rather than stroking or kneading.

Ultraviolet irradiation is of proved therapeutic value in lupus vulgaris of the ear and nose and in tuberculous infection of the larynx. Galvanism in the form of ion transfer is sometimes used with zinc sulfate in chronic suppurative otitis media and in allergic rhinitis.[75]

Wiener[81] has written on the use of electrotherapy in ophthalmology. Beneficial effects of diathermy on experimental sepsis were noted, and iontophoresis with adrenalin and Mecholyl were reported as of value. Wiener also describes the deleterious effects of ultraviolet irradiation on the cornea, and explains the action of different wave lengths on the cornea, lens and aqueous and vitreous humors in relation to the relative absorption and transmission.

Diseases of Skin

In the treatment of cutaneous disorders ultraviolet irradiation is the most familiar physical-therapy measure. Although this source of energy has been used empirically for almost every type of skin rash, it has been found to be of value in a limited number of conditions and to be distinctly deleterious in others. Cipollaro[82] and Beaumont[83] have recently summarized the beneficial effects of irradiation in diseases of the skin. An authoritative review of the subject of ultraviolet therapy has been issued by the Council of Physical Therapy of the American Medical Association.[27]

The consensus is that ultraviolet irradiation is of definite value in the treatment of a number of dermatoses in conjunction with topical application and general measures. Patients with acne vulgaris are benefited by erythema doses of artificial ultraviolet rays once or twice a week. More vigorous treatment may be necessary in chronic deep-seated pustules and cystlike lesions. In these cases irradiation with pressure from an air-cooled or water-cooled lamp may be used. Ultraviolet irradiation is often used for furunculosis or other pyogenic disorders, but there is no conclusive evidence of any great benefit. It has also been found to be of little value in the treatment of fungus infection. In psoriasis, general body irradiation speeds resolution of the lesions. The combination of tar and ultraviolet irradiation, as recommended by Goeckerman,[84] has given better results than has the use of the latter alone. This consists in applying a 3 per cent crude-coal-tar ointment at night. The next morning the ointment is wiped off. This is followed by irradiation of the whole body, after which a bath may be taken. When possible the treatment is given daily with a graduated dosage.

Lupus vulgaris is definitely benefited by ultraviolet rays. A combination of local and general irradiation yields the best result. The concentrated carbon arc employed by the Finsen method or compression with a cooled arc lamp is satisfactory, for local use and heliotherapy or an air-cooled quartz-mercury arc lamp for general irradiation.

Regarding the undesirable effects of ultraviolet rays, it is to be noted that patients with lupus erythematosus may be photosensitive and that cases have been reported of the precipitation of disseminated lupus erythematosus by ultraviolet irradiation, with alarming results. Many acute and subacute inflammations may also be made more acute or caused to spread by too vigorous ultraviolet treatment. Some patients are light-sensitive and exposure may produce eruptions such as hydroa vacciniforme and urticaria.[85] The presence of porphyrin, certain dyes and sulfonamides may also cause photosensitivity. The present knowledge of unusual light reactions has been authoritatively presented in a monograph by Blum,[86] one of the leading investigators in this field.

Blum[87] has also written an interesting and factual article on the military aspects of sunburn. The physical and meteorologic factors involved are dis-

cussed, as well as the physiologic changes in the skin and other tissues. Dangers from overexposure and photosensitization are mentioned, and the methods of protection are described.

Although ultraviolet irradiation is the most familiar physical agent used in the treatment of skin diseases, there are other physical-therapy methods of value in some disorders. Galvanic current is used to remove superfluous hairs by electrolysis and for the ion transfer of drugs such as Mecholyl, histamine, zinc sulfate and copper sulfate. Mecholyl is used to soften patches of scleroderma,[88] and copper sulfate to control fungus infections of the hands and feet, although there is some controversy concerning its effectiveness and that of zinc sulfate.[89] Medicated baths are widely used, but are considered as medical rather than physical therapy. Massage is occasionally of value, as in the treatment of contracting scars and scleroderma.

Peripheral Vascular Disease

A variety of physical procedures in the treatment of peripheral vascular diseases have enjoyed popularity.[90] The present status of physical medicine in these conditions has been excellently reviewed by Allen and Kvale.[91] Agents to be applied locally include hot packs and sterile warm dressings or continuous wet dressings, avoiding temperatures above 105°F. In the prevention of edema Unna's boot is not so popular as in the past; usually some form of bandaging is applied, such as an Ace bandage, an elastic cloth or a rubber stocking. Compression sponges may be used around ulcers. The greatest use of physical therapy has been for the purpose of improving arterial circulation. Postural exercises, such as those suggested by Buerger or the modified methods of Allen, have been much favored. Although these are widely used, there is little scientific evidence that they are of any value. Contrast baths have also been popular until recent years, when their efficacy has been doubted.[92] Local application of heat is used to cause hyperemia and thus to improve circulation, but in the presence of occlusive vascular disease it may result in burning, for the local tissue metabolism may be increased more than is the circulation, even from the application of moderate degrees of warmth.[93] With carefully constructed thermostatically controlled cradles it is possible to maintain a temperature of 90°F. with safety. A superior method, where possible, is to maintain the environmental temperature at 86 to 90°F. Short-wave diathermy may be extremely dangerous when applied locally, but temporary increase in the circulation of extremities may be effected by applying diathermy to the lumbosacral region.[94] The circulation to the lower extremities may also be increased reflexly by application of heat to the upper extremities for prolonged periods, a procedure made possible by the use of an electric heating sleeve. Intermittent suction and pressure had great vogue when the apparatus was first available. The present situation concerning this type of therapy has been summarized by Allen and Kvale,[91] who state:

> This method of treatment has some clinical value, but just how much has not been determined, because it has not been employed extensively as the sole method of treatment. The observation that it increases transiently the flow of blood to the extremities is probably true, but it should be pointed out that the circulation of the extremity can be increased transiently in a number of much more simple ways, such as for example immersion of the hand in water at 113°F., resting in a room the temperature of which is about 86°F. or drinking an alcoholic beverage. We do not believe that there is as yet adequate evidence to enable us to accept the thesis that treatment with suction and pressure produces a permanent increase in the circulation to the extremities.

These writers also believe that intermittent venous compression has a limited usefulness. The oscillating bed has been found to be a valuable addition to the treatment of disease of the peripheral arteries when combined with other methods of treatment. The spa treatment of thromboangiitis obliterans has been critically analyzed by Fatherree and Hurst.[95] They conclude that such treatment is nonspecific and that the majority of patients continue to have active manifestations of Buerger's disease after considerable periods of therapy.

Infection

Artificial-fever therapy is the most important physical means of controlling certain infectious diseases, but the necessity of using this type of treatment is diminishing with the development of increasingly potent drugs. Syphilis of the central nervous system and sulfonamide-resistant gonorrhea present indications for fever treatment.[96] Brucellosis spondylitis has responded favorably in small series of cases reported by Phalen, Prickman and Krusen[97] and by Joy and Moor.[98] Stone[99] has advocated fever therapy together with intrathecal thiamine in the treatment of acute poliomyelitis, but largely on empirical grounds and without convincing results. Since artificial fevers should be administered only in hospitals with fever departments, further discussion in connection with general medical practice is not appropriate.

Ultraviolet irradiation of autotransfused blood has been used in a few clinics in the treatment of pyogenic infections of various types. Knott originally described the method, and Rebbeck[100–103] and Miley[104–106] have reported its use in over 1000 patients with a variety of severe infections, including those resistant to chemotherapy. It is claimed that this method of ultraviolet irradiation reduces toxicity, has a bactericidal effect, and produces vasodilatation and increased venous-oxygen content. The results are presented largely in the form of case reports, and it is difficult to evaluate the true effectiveness of this therapy in the absence of well-controlled series of observations. This treatment is purely a hospital procedure.

Preventive Medicine

Some of the procedures of physical medicine have value in the field of preventive medicine as well as in therapeutics. The outstanding example of this relates to training in proper body mechanics and the correction of postural defects. General practitioners have an excellent opportunity to instruct their patients in the correct principles of body alignment. Thelander and Fitzhugh[107] emphasize the importance of recognizing malalignments in early childhood and of correcting them before weight-bearing begins. Distorted sleeping and sitting positions during infancy and childhood were found to cause permanent distortions of the feet, ankles and knees. These writers outline simple measures to help in normal symmetrical development.

The physiologic aspects of posture have been reviewed by Hellebrandt and Franseen.[108] The instability of the vertical stance and the hydrostatic handicap on circulation were noted, but the automatic compensatory mechanisms were found adequate in the majority of normal subjects. Hellebrandt and Franseen's studies have shown that exhaustive muscular contraction is not necessary for adequate equilibration and that standing is cheap in terms of metabolic cost, the sense of fatigue probably being due to hypoxemia of higher nerve centers. Although it has been demonstrated that improvement in body mechanics is associated with a decrease in energy exchange, it has not as yet been decisively shown that posture plays an etiologic role in many of the symptoms and dysfunctions of the viscera commonly attributed to the vertical stance.

Control of muscular tension in the form of cultivated relaxation has been advocated by Jacobson[109] to prevent "nervous breakdowns," and the technics of therapeutic relaxation have been described by Rathbone.[110] The principles underlying therapeutic exercise and practical aspects of prescription have been clearly presented by Elkins.[111]

The disinfection of the air by ultraviolet irradiation for the prevention of air-borne disease, although still largely in the experimental stage, is of some practical interest. A symposium on the subject was recently presented at a meeting of the American Association for the Advancement of Science.[112]

References

1. Lowry, F. P. Physical therapy. *New Eng. J. Med.* **221**:424-428, 1939.
2. Watkins, A. L. Physical therapy. *New Eng. J. Med.* **225**:539-545, 1941.
3. *Idem.* Physical therapy for diseases of nervous system. *New Eng. J. Med.* **227**:48-53, 1942.
4. *Idem.* Physical therapy in surgical practice. *New Eng. J. Med.* **228**: 543-547, 1943.
5. Piersol, G. M. Value of physical therapy in internal medicine. *J. A. M. A.* **117**:1835-1839, 1941.
6. *Idem.* Physical therapy in certain medical conditions. *Arch. Phys. Therapy* **24**:5-13, 1943
7. Short, C. L., and Bauer, W. Treatment of rheumatoid arthritis. *New Eng. J. Med.* **227**:442-450, 1942.
8. Elliston, W. A., Silber, M. F., and Grover, D. Physiotherapy in rheumatoid arthritis. *New Eng. J. Med.* **224**:150-156, 1941.
9. Krusen, F. H. Physical therapy in arthritis with special reference to home treatment. *J. A. M. A.* **115**:605-615, 1940.
10. *Idem.* Methods of applying heat locally in general practice. *Arch. Phys. Therapy* **22**:531-539, 1941.
11. Zeiter, W. J. Clinical application of paraffin bath. *Arch. Phys. Therapy* **20**:469-472, 1939.
12. Reiley, R. E., and Knapp, M. E. Symptomatic relief in chronic and acute arthritides by histamine iontophoresis. *Arch. Phys. Therapy* **22**:288-294, 1941.
13. Council on Pharmacy and Chemistry and Council on Physical Therapy. Ion transfer (iontophoresis). *J. A. M. A.* **117**:360, 1941.
14. Smyth, C. J., and Freyberg, R. H. Evaluation of iontophoresis using different vasodilating drugs for treatment of rheumatoid arthritis. *Am. J. M. Sc.* **203**:580-589, 1942.
15. Solomon, W. M., and Strecher, R. M. Treatment of atrophic arthritis with artificial fever therapy. *Arch. Phys. Therapy* **21**:339-342, 1942.
16. McLoughlin, C. J. Massage in internal medicine. *Arch. Phys. Therapy* **22**:674-684, 1941.
17. Bodenham, D. C. Control of ulnar deviation of fingers in rheumatoid arthritis. *Lancet* **2**:354, 1943.
18. Kuhns, J. G. Treatment of arthritic contractures of knee. *New Eng. J. Med.* **227**:975-980, 1942.
19. *Idem.* Painful feet, posture and exercises, splints and supports, manipulative treatment and operations and surgical procedures. In Steinbrocker, O. *Arthritis in Modern Practice: The diagnosis and management of rheumatic and allied conditions.* Chap. XX–XXIV. 606 pp. Philadelphia: W. B. Saunders Company, 1941.
20. Treusch, J. V., and Krusen, F. H. Physical therapy applied at home for arthritis: follow-up study, with supplementary summary of sedimentation rate of erythrocytes in two hundred and twenty-nine cases of arthritis. *Arch. Int. Med.* **72**:231-238, 1943.
21. Watkins, A. L. Coordination of physical therapy and occupational therapy. *Occup. Therapy* **22**:115-119, 1943.
22. Short, C. L., and Bauer, W. Treatment of degenerative joint disease. *New Eng. J. Med.* **225**:145-150, 1941.
23. Kuhns, J. G. Orthopaedic treatment of hypertrophic arthritis of hip. *J. Bone & Joint Surg.* **24**:547-554, 1942.
24. Bennett, A., Waine, H., and Bauer, W. *Changes in the Knee Joint at Various Ages: With particular reference to the nature and development of degenerative joint disease.* 97 pp. The Commonwealth Fund. London: Oxford University Press, 1942.
25. Black, J. B., Dunnley, R. K., and Camp, J. D. Senile osteoporosis of spinal column. *J. A. M. A.* **117**:2144-2150, 1941.
26. Bauer, W., and Short, C. L. Treatment of arthritides of known origin. *New Eng. J. Med.* **223**:286-293, 1940.
27. Council on Physical Therapy. Therapeutic value of ultraviolet radiation. *J. A. M. A.* **120**:620-623, 1942; **121**:126-129 and 513-515, 1943.
28. Kendell, H. W., Rose, D. L., and Simpson, W. M. Combined artificial fever-chemotherapy in gonococcic infections resistant to chemotherapy alone. *J. A. M. A.* **116**:357-363, 1941.
29. Peterson, D. B., and Beuchat, E. S. Treatment of gonorrhea at Fitzsimons General Hospital: study of cases from September 1, 1938 to October 31, 1940. *J. A. M. A.* **118**:129-132, 1942.
30. Krusen, F. H., and Elkins, E. C. Fever therapy by physical means. *J. A. M. A.* **112**:1689-1696, 1939.
31. Ayer, J. B. Radiculitis following injections of antitetanic serum: report of five cases. *J. Nerv. and Ment. Dis.* **81**:676-682, 1935.
32. Hines, H. M. Physiologic basis for treatment of paralyzed muscle. *Arch. Phys. Therapy* **24**:69-73, 1943.
33. Spurling, R. G., and Grantham, E. G. Painful arm and shoulder: with especial reference to problem of scalenus neurocirculatory compression. *J. Missouri M. A.* **38**:340-343, 1941.
34. Hansson, K. G. Cervico-brachial syndrome. *Arch. Phys. Therapy* **22**:662-666, 1941.
35. Mettler, S. R., and Capp, C. S. Neurological symptoms and clinical findings in patients with cervical degenerative arthritis. *Ann. Int. Med.* **14**:1315-1322, 1941.
36. McFarland, J. W., and Krusen, F. H. Use of Sayre head sling in osteoarthritis of cervical portion of spinal column. *Arch. Phys. Therapy* **24**:263-269, 1943.
37. Boynton, B. L. Cervical fibromyositis and headache. *Virginia M. Monthly* **68**:587-589, 1941.
38. Beeson, P. B., and Scott, T. F. M. Epidemic myalgia distinct from Bornholm disease, which chiefly affected muscles of neck. *Ann. Rheumat. Dis.* **2**:247-256, 1941.
39. Hutchison, J. H. Nonarticular rheumatism in army: symptomatology, etiology, and treatment. *Int. Abstr.* **75**:271, 1942.
40. Good, M. Five hundred cases of myalgia in British Army. *Ann. Rheumat. Dis.* **3**:118-138, 1942.
41. Seydell, E. M. Indurative or myalgic headache. *Arch. Otolaryngol.* **32**:860-876, 1940.
42. Copeman, W. S. C. Aetiology of fibrositic nodule: clinical contribution. *Brit. M. J.* **2**:263, 1943.
43. Krusen, F. H. Physical therapeutic management of fibrositis. *M. Clin. North America* **27**:903-912, 1943.
44. Fredette, J. W. Manipulative surgery. *Arch. Phys. Therapy* **24**: 93-99, 1943.
45. Dawson, G. R. Low back pain and sciatica caused by faulty mechanics at lumbosacral area. *J. South Carolina M. A.* **37**:242-249, 1941.
46. Krusen, F. H. Backache: relation of physical therapy to its management. *Canad. M. A. J.* **42**:534-541, 1940.
47. Jostes, F. A. Further studies in manipulative treatment of backache. *Arch. Phys. Therapy* **22**:515-525, 1941.
48. Nutt, J. J. Painful feet. *Ann. Int. Med.* **17**:842-848, 1942.
49. Jordan, H. H. Foot problems in wartime. *Arch. Phys. Therapy* **24**: 524-532, 1943.
50. Dredge, T. E. Physical treatment of disabilities of foot commonly encountered in military service. *Arch. Phys. Therapy* **24**:653-659, 1943.
51. Laurens, H. Physiological effects of ultraviolet radiation. In *Aerobiology.* Publication No. 17. Edited by F. R. Moulton. 289 pp. Washington, D. C.: American Association for the Advancement of Science, 1942. Pp. 142-155.
52. Apperly, F. L. Relation of pernicious anemia to solar radiation and skin cancer. *Am. J. M. Sc.* **203**:854-856, 1942.
53. Dynes, J. B., and Norcross, J. W. Peripheral neuritis as complication of pernicious anemia and combined system disease. *J. A. M. A.* **122**:586-588, 1943.

54. Nutini, L. G. Growth-promoting role of ultraviolet in wound healing. In *Aerobiology*. Publication No. 17. Edited by F. R. Moulton. 289 pp. Washington, D. C.: American Association for the Advancement of Science, 1942. Pp. 193-196.
55. Bauer, W., and Klemperer, F. Gout. In *Diseases of Metabolism: Detailed methods of diagnosis and treatment*. Edited by G. G. Duncan. 985 pp. Philadelphia: W. B. Saunders Company, 1942. Pp. 609-654.
56. Barieh, E. C. Successful treatment of gout. *Ann. Int. Med.* **18**: 21-28, 1943.
57. Drury, D. R., Wick, A. N., and MacKay, E. M. Action of exercise on ketosis. *Am. J. Physiol.* **134**:761-768, 1941.
58. Cawadias, A. P. New trends in treatment of obesity: role of physical medicine. *Brit. J. Phys. Med.* **6**:2-5, 1943.
59. Billig, H. E., Jr. Dysmenorrhea: result of postural defect. *Arch. Surg.* **46**:611-613, 1943.
60. Dawson, A. B. Early estrus in cat following increased illumination. *Endocrinology* **28**:907-910, 1941.
61. Wetherbee, W., Jr., Foley, J. A., and Resnik, J. Diathermy in lobar pneumonia: preliminary report. *New Eng. J. Med.* **213**: 796-798, 1935.
62. Asthma Research Council. *Physical Exercises for Asthma*. Third edition. 32 pp. London: Asthma Research Council, 1939.
63. Miley, G. P., Seidel, R. E., and Christensen, J. A. Preliminary report of results observed in eighty cases of intractable bronchial asthma. *Arch. Phys. Therapy* **24**:533-542, 1943.
64. Hyde, R. W. Fever therapy in allergic disease. *New Eng. J. Med.* **222**:839-843, 1940.
65. Brugsch, H. G., and Pratt, J. H. Short wave diathermy in treatment of lung abscess. *J. A. M. A.* **112**:2114-2119, 1939.
66. Bisgard, J. D. Thoracogenic scoliosis: influence of thoracic disease and thoracic operations on spine. *Arch. Surg.* **29**:417-445, 1934.
67. Habeeb, W. J. Exercise in tuberculosis; plea for conservatism. *Ohio State M. J.* **36**:609-611, 1940.
68. Haworth, N. A., and Macdonald, E. M. *Theory of Occupational Therapy for Students and Nurses*. With foreword by R. S. Woods. 132 pp. Baltimore: Williams and Wilkins Company, 1941.
69. Parsons-Smith, B. Rehabilitation of heart patients. *Brit. M. J.* **2**:298, 1943.
70. Heap, M. F. Relearning to walk. *Physiotherapy Rev.* **23**:208, 1943.
71. Askey, J. M. Syndrome of painful disability of shoulder and hand complicating coronary occlusion. *Am. Heart J.* **22**:1-12, 1941.
72. Johnson, A. C. Disabling changes in hands resembling sclerodactylia, following myocardial infarction. *Ann. Int. Med.* **19**:433-456, 1943.
73. Kehl, K. C. Dupuytren's contracture as sequel to coronary artery disease and myocardial infarction. *Ann. Int. Med.* **19**:213-223, 1943.
74. Smith, J. R., and Kountz, W. B. Deformities of thoracic spine as cause of anginoid pain. *Ann. Int. Med.* **17**:604-617, 1942.
75. Hollender, A. R. Physical therapeutic procedures in otolaryngology: résumé of twenty years' experience. *Arch. Phys. Therapy* **24**: 88-92, 1943.
76. *Idem. Physical Therapeutic Methods in Otolaryngology*. 442 pp. St. Louis: C. V. Mosby Company, 1937.
77. Goodale, R. L. Treatment of sinusitis. *New Eng. J. Med.* **229**: 622-625, 1943.
78. Brighton, G. R., Snow, W. B., and Friedman, H. S. Short wave therapy in treatment of sinusitis and allergic rhinitis. *J. A. M. A.* **118**:507-510, 1942.
79. Teed, R. W., and Kraus, J. D. Ultrahigh frequency diathermy in otolaryngology, with especial reference to dosage measurement. *Arch. Otolaryng.* **34**:743-757, 1941.
80. Williams, H. L., and Elkins, E. C. Myalgia of pharynx. *Arch. Otolaryng.* **36**:1-11, 1942.
81. Wiener, M. J. Electrotherapy in ophthalmology. *J. Oklahoma State M. A.* **34**:467-471, 1941.
82. Cipollaro, A. C. Physical therapy in relation to dermatology: résumé. *Arch. Phys. Therapy* **22**:525-531, 1941.
83. Beaumont, W. Irradiation treatment of some common skin conditions. *Brit. J. Phys. Med.* **6**:110-113, 1943.
84. Goeckerman, W. H. Tar and ultra-violet radiation in treatment of psoriasis. *Brit. J. Phys. Med.* **7**:215-217, 1933.
85. Watkins, A. L. Infra-red urticaria. *Arch. Phys. Therapy* **24**:291-294, 1943.
86. Blum, H. F. *Photodynamic Action and Diseases Caused by Light*. 309 pp. New York: Reinhold Publishing Corporation, 1941.
87. *Idem*. Military aspects of sunburn. *War Med.* **4**:388-399, 1943.
88. Duryee, A. W., and Wright, I. S. Treatment of scleroderma by means of acetyl beta methyl choline chloride (mecholyl) iontophoresis. *Am. Heart J.* **14**:603-613, 1937.
89. Hoechstetter, S. Fungus infection of the feet treated by copper iontophoresis. *Mil. Surgeon* **87**:50-53, 1940.
90. Warshawsky, H., and Dempsey, M. W. Physical therapy of peripheral vascular disease. *Arch. Phys. Therapy* **24**:487-494, 1943.
91. Allen, E. V., and Kvale, W. F. Physical medicine in vascular diseases. *M. Clin. North America* **27**:951-993, 1943.
92. Wright, I. S. Conservative treatment of occlusive arterial disease. *New Eng. J. Med.* **225**:805-811, 1941.
93. Freeman, N. E. Influence of temperature on development of gangrene in peripheral vascular disease. *Arch. Surg.* **40**:326-333, 1940.
94. Bennett, R. L., Hines, E. A., Jr., and Kruesen, F. H. Effect of short-wave diathermy on cutaneous temperatures of feet. *Am. Heart J.* **21**:490-503, 1941.
95. Fatherree, T. J., and Hurst, C. Spa treatment of thromboangiitis obliterans. *Am. Heart J.* **22**:180-194, 1941.
96. Taylor, G. B. Fever therapy. *Ann. Int. Med.* **18**:968-973, 1943.
97. Phalen, G. S., Prickman, L. E., and Krusen, F. H. Brucellosis spondylitis: treatment by physically induced hyperpyrexia. *J. A. M. A.* **117**:859-862, 1942.
98. Joy, G. L., and Moor, F. B. Artificial fever therapy in brucellosis. *Arch. Phys. Therapy* **24**:557-561, 1943.
99. Stone, S. Artificial fever and vitamin therapy in treatment of anterior poliomyelitis. Report on intraspinal administration of thiamine chloride combined with artificial fever therapy. *Arch. Phys. Therapy* **24**:350-361, 1943.
100. Rebbeck, E. W. Ultraviolet irradiation of autotransfused blood in treatment of puerperal sepsis. *Am. J. Surg.* **54**:691-700, 1941.
101. Rebbeck, E. W., and Walther, R. A. Double septicemia following prostatectomy treated by Knott technic of ultraviolet blood irradiation; case report. *Am. J. Surg.* **57**:536-538, 1942.
102. Rebbeck, E. W. Ultraviolet irradiation of autotransfused blood in treatment of post abortional sepsis. *Am. J. Surg.* **55**:476-486, 1942.
103. *Idem*. Ultraviolet irradiation of blood in treatment of Escherichia coli septicemia. *Arch. Phys. Therapy* **24**:158-167, 1943.
104. Miley, G. Ultraviolet blood irradiation therapy. *Arch. Phys. Therapy* **23**:536-551, 1942.
105. *Idem*. Ultraviolet blood irradiation therapy (Knott technic) in acute pyogenic infections. *Am. J. Surg.* **57**:493-507, 1942.
106. *Idem*. Knott technic of ultraviolet blood irradiation in acute pyogenic infections: study of 103 cases with clinical observations on effects of new therapeutic agent. *New York State J. Med.* **42**: 38-46, 1942.
107. Thelander, H. E., and Fitzhugh, M. L. Posture habits in infancy affecting foot and leg alignments. *J. Pediat.* **21**:306-314, 1942.
108. Hellebrandt, F. A., and Franseen, E. B. Physiological study of vertical stance of man. *Physiol. Rev.* **23**:220-255, 1943.
109. Jacobson, E. Cultivated relaxation for elimination of "nervous breakdowns." *Arch. Phys. Therapy* **24**:133-143, 1943.
110. Rathbone, J. L. *Relaxation*. 157 pp. New York: Bureau of Publications, Teachers College, Columbia University, 1943.
111. Elkins, E. C. Some principles which underlie therapeutic exercises. *M. Clin. North America* **27**:923-950, 1943.
112. *Aerobiology*. Publication No. 17. Edited by F. R. Moulton. 289 pp. Washington, D. C.: American Association for the Advancement of Science, 1942.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor**

BENJAMIN CASTLEMAN, M.D., *Acting Editor*

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CASE 30111

PRESENTATION OF CASE

A forty-six-year-old housewife was admitted to the hospital because of abdominal pain.

The history was unsatisfactory because of language difficulty. She was said to have had asthma for years. About twenty months before entry, following her son's enlistment in the Army, she began to "go to pieces" and soon became weak and was forced to go to bed. She was admitted to a community hospital on two occasions within a period of several weeks, because of difficulty in getting her breath, epigastric pain and weakness. She was told that she had heart trouble. She then entered another hospital, where she was treated for "congestive failure, bronchial asthma and chronic bronchitis." She was discharged against advice on the seventh hospital day. She remained at home for three weeks, during which period she was nauseated, vomited a "good bit of her ingested food," had difficulty in getting her breath and was bedridden. The upper abdominal pain continued. She had blood-tinged sputum on several occasions. There was a weight loss of several pounds over a period of months. There was no history of malaria, typhoid fever, dysentery, rheumatic fever, pneumonia, tuberculosis or diabetes.

Physical examination showed a pale woman in moderate distress. The heart was enlarged. The left border of cardiac dullness was 10 cm. to the left of the midline in the fifth space, the right border 2 cm. to the right of the midsternal line. The rate at times was regular, but there were irregularities, which may have been extrasystoles or due to fibrillation. There was a pulse deficit of 12. The pulmonic second sound was greater than the aortic. The lung fields were resonant, with a prolonged expiratory phase and an inspiratory wheeze. The abdomen was protuberant, and there was shifting dullness in both flanks. A tender mass was felt in the right upper quadrant that extended a handbreadth below the costal margin and merged with the liver. A hiatus hernia was noted in the rectus sheath underlying the umbilicus. There was slight pitting edema of the lower legs and sacrum.

*On leave of absence.

The blood pressure was 148 systolic, 100 diastolic. The temperature was 99.6°F., the pulse 120, and the respirations 28.

Examination of the blood showed a red-cell count of 3,650,000, with 10.7 gm. of hemoglobin. The white-cell count was 8700, with 85 per cent neutrophils. A blood Hinton test was negative. The urine was acid, with a specific gravity of 1.018 and a ++ test for albumin. There were 50 white cells per high-power field in the sediment. The blood sugar was 65 mg. per 100 cc., and the nonprotein nitrogen 16 mg. The serum bilirubin was 0.9 mg. per 100 cc. direct, and 2.0 mg. indirect. The stools gave a ++++ guaiac test. One vomitus was guaiac negative.

X-ray films of the chest showed general enlargement of the heart. The vascular markings and hilar shadows were increased in diameter. The diaphragm was normal in position and showed limitation of motion. No definite evidence of fluid was seen. There was thickening of the interlobar septums between the right middle, upper and lower lobes. A plain film of the abdomen showed an area of calcification in the left side of the pelvis, probably a calcified fibroid. There was ascites, and the liver was slightly enlarged. No definite masses were seen. The splenic shadow was not well visualized. A barium enema revealed no evidence of gross obstruction. The examination was unsatisfactory because the colon had not been previously prepared. An electrocardiogram showed occasional ventricular premature beats. The rate was 110. There was slight late inversion of the T wave in Leads 1 and 2, and slight late inversion of the T wave in CF_5. The R wave was small in CF_2 and CF_4. The premature beats in CF_5 varied in direction.

The vomiting and pain continued, and one vomitus was guaiac positive. On the seventh hospital day the temperature rose to 103°F., the pulse to 140, and the respirations to 35. There were bronchial breathing and egophony, with dullness over the right base. The white-cell count was 28,500, with 90 per cent neutrophils. An x-ray film of the chest showed suggestive mottling of the right base. A throat culture gave few beta-hemolytic streptococci. The patient was given 1500 cc. of intravenous fluid almost daily, and 2.5 gm. of sodium sulfadiazine daily for six days. The stools still gave a ++++ guaiac test. An abdominal paracentesis on the eighth day yielded 4500 cc. of murky, red-brown fluid, with a specific gravity of 1.010. The cell count was 8800 red cells and 1200 white cells, 95 per cent of the latter being neutrophils. No tumor cells were seen. The fluid was not cultured. Abdominal examination revealed a tender right-sided mass extending to the right lower quadrant. A sense of resistance was palpated in the left upper quadrant, but there were no masses. A Miller–Abbott tube was passed with some relief.

On the seventh hospital day the temperature fell to normal, the pulse to 110, and the respirations to 30. The Miller–Abbott tube was three fourths of the way down, and although a few coils were seen in the stomach, the tip of the tube was in the small intestine. A few dilated loops of small intestine could be seen by x-ray, some of which appeared to be proximal to the tip of the tube. The patient continued to bring up bile and gastric contents by mouth. She was given 500 cc. of blood. A peritoneoscopy on the twelfth day revealed a mass in the right abdomen that looked like dilated loops of small bowel. These seemed to be adherent to the peritoneum of the abdominal wall. No evidence of carcinoma was seen. The following day there was icterus of the skin and scleras. The urine gave a ++ bile test. The chest was entirely clear both by examination and x-ray. Sulfadiazine was stopped. The distention continued, and the upper abdominal pain persisted. The white-cell count was 25,000. The van den Bergh was 3.3 mg. direct, and 4.1 mg. indirect. X-ray examination on the fifteenth hospital day showed the tip of the Miller–Abbott tube to be in the jejunum. There were several dilated loops of small bowel. A peculiar shadow of increased density was seen along the lateral margin of the right side of the abdomen, apparently between the bowel and the lateral abdominal wall; this suggested the presence of free air within the abdomen. There was evidence of fluid in the peritoneal cavity.

On the sixteenth day an exploratory laparotomy was performed.

Differential Diagnosis

Dr. Leland S. McKittrick: I wonder if you know how little the statement concerning the electrocardiogram means to me. I am just going on the assumption that the woman had something wrong with her heart. Beyond that, I have not the remotest idea. I will put it all up to one of the experts later.

Is it fair to ask a question? I cannot determine from the expressions "A tender mass was felt in the right upper quadrant that extended a handbreadth below the costal margin and merged with the liver," and the one stated later, "Abdominal examination now revealed a tender right-sided mass extending to the right lower quadrant," whether it was supposed that this abdominal mass had increased in size.

Dr. Benjamin Castleman: I do not believe so.

Dr. McKittrick: Would this be the proper time to see the x-ray films?

Dr. George W. Holmes: The first film was taken a month previous to the other two. This is the series of films taken after the introduction of the Miller–Abbott tube, and this is the plain film of the abdomen.

The first thing to dispose of is the shadow in the pelvis; it is probably a calcified fibroid. The diaphragm is high on both sides in all the films, even in those taken previously. There was no marked change n the position of the diaphragm over a period of a month; if she was accumulating fluid in the abdomen, however, the diaphragm should have become progressively higher. The heart shadow lies horizontal in the chest, because of the high position of the diaphragm, and appears somewhat larger than it actually is. There is no question about the heart's being enlarged. The enlargement is somewhat general but is greatest toward the left in the region of the ventricle. There is no marked dilatation or deformity of the great vessels, and no evidence of calcification. The calcified gland near the hilus probably represents tuberculous infection at some time.

The barium enema is shown here, and to all appearances is normal. There is no evidence of disease in the colon.

In this plain film taken of the abdomen, there are loops that contain air and some of them are small bowel. I think it is fair to say that they are slightly larger than those that we usually see. There is also a general haziness of the whole abdomen, often seen when there is a considerable amount of fluid. The progress of the Miller–Abbott tube was apparently rather slow. That occurs sometimes when the bowel is partially paralyzed. Whether it was due to that or to poor technic, I do not know. The large amount of gas that you see here is probably in the stomach. Again, there are moderately dilated loops of small bowel. It does not seem as if the obstruction in the small bowel as shown in these films is sufficient to have caused the patient's symptoms. It is not very striking evidence at any rate. About the size of the liver — there was, of course, a rather high diaphragm, and the lower edge of the liver is not well seen in any of these films, but it does not seem to be much lower than normal. I should not expect to find an enormously enlarged liver; it might have been moderately enlarged.

Dr. McKittrick: I am perfectly frank to confess that I cannot make a diagnosis, and I am sure that the evidence is here if I just knew how to put it together. There are a few conditions that I can rule out after reasoning, but I do not know how I am going to end up.

One cannot really call this woman's history acute, although it may have been subacute. She had been in other hospitals and had been sick for a matter of weeks before she came in here. I believe that I have a right to assume that she had something wrong with her heart. Maybe I ought to know what it is; but I do not. On inadequate grounds I suspect that there was a moderate degree of decompensation. All of which may or may not be related to my problem. Attention at the moment is focused on the abdomen by a tender mass in the right upper quadrant and by the presence of bloody fluid in the peritoneal cavity. I have to try to put together

these two things, as well as a positive guaiac test on the stools. I shall dispose of certain things without hesitation.

Any free air in the peritoneal cavity was probably the result of the peritoneoscopy. The patient had a definite increase in indirect bilirubin, and I suspect that this had something to do with the bloody fluid in the peritoneal cavity. I must, then, co-ordinate a positive indirect bilirubin and heart disease of some kind with the mass in the right upper quadrant, the bloody fluid in the peritoneal cavity and the positive guaiac test in the stools, and I am not finding this too easy. If she had not had bloody fluid, I could make a diagnosis that would satisfy me even though it might be wrong. With this combination I can make a diagnosis that is wrong but cannot have the pleasure of making one that completely satisfies me.

The first diagnosis that should be considered is cancer. The patient was forty-six years old and had ascites, bloody fluid in the peritoneal cavity, a mass in the right upper quadrant and a mass in the pelvis. Carcinomatosis is a logical diagnosis and I cannot talk myself out of it except on one basis. Bloody fluid in the peritoneal cavity due to cancer is usually associated with a lot of excrescences and with fairly obvious carcinomatosis as seen either through the peritoneoscope or at exploration. It is my impression that it most commonly comes from ovarian carcinoma and that large tumor masses usually sprout out here and there in the peritoneal cavity. If peritoneoscopy did not reveal any of these things, then I cannot make that diagnosis.

How about carcinoma of the bowel? The positive guaiac test in the stools, the mass in the right upper quadrant, the secondary anemia and the bloody fluid are suggestive. I cannot, however, make a diagnosis of carcinoma of the bowel and be satisfied. I do not recall that I have seen bloody fluid in the peritoneal fluid secondary to intestinal cancer. I am sure one can get it but there again, I have the same problem of the peritoneoscopy, and I have to drop it.

I might make a diagnosis of a gallstone that has eroded through the gall bladder to form an abscess, but I have to drop that diagnosis immediately because of the bloody fluid. That is definitely out so far as logical reasoning or any experience of mine goes.

I might make a diagnosis of acute pancreatitis, which can cause bloody fluid and make a person quite sick, but this story is too chronic. When pancreatitis causes bloody fluid, one has a fairly acute, dramatic process. This woman did not present that picture, so I must drop that diagnosis.

What else causes bloody fluid and a mass? Torsion of an abdominal viscus will do it, as will some interference with blood supply to a segment of bowel, either due to mesenteric emboli or mesenteric thrombosis. Strangulation of the small bowel and obstruction will give bloody fluid and a mass. Here again, I cannot happily make a diagnosis of strangulated small-bowel obstruction for two reasons: I do not believe she had an obstruction, and obstruction due to strangulation should have a sudden, acute onset. This type of obstruction may go over into a chronic state, with a mass and abscess with dead bowel that is walled off, but it should have a sudden onset. There is no dramatic onset here that I can pick out.

What about mesenteric thrombosis? Recurrent emboli or thrombi ultimately culminating in death of a segment of bowel with localization and walling off of this dead bowel is entirely within the realm of possibility. The presence of heart disease is quite in keeping with this interpretation. This would also give a positive guaiac test in the stools, but is again a farfetched explanation it seems to me; yet I know it occurs. It is so uncommon, however, that it is a difficult diagnosis to make.

I have almost talked myself out of all the things that I can think of, without arriving at a positive conclusion. I think that this woman had a process in the right upper quadrant that involved the bowel, probably the small bowel. I suspect that there was a perforation and localized walling off of that bowel. If I say that and if I believe that that is what she had, then I have to explain it on the basis either of some fairly unusual manifestation of recurrent torsion ultimately ending in strangulation or of many small, minor insults to this woman's vascular tree ultimately ending in one of sufficient magnitude to cause death to at least a small segment of bowel with a resulting localization around it. She may have had general peritonitis, but there is no reason to suppose that she did. She did not at the time of peritoneoscopy. I do not believe that she had mechanical small-bowel obstruction. I cannot do any better than that.

Dr. Benjamin Castleman: Dr. Williams, would you like to comment?

Dr. Conger Williams: I saw this patient when she first came in. She did not speak English, and we could not obtain a history. I thought, as Dr. McKittrick did, that she had some sort of heart disease, but I did not know what. There was definite evidence that she had congestive failure. There was an inconstant gallop rhythm, a very loud pulmonic second sound, pulmonary congestion, dilated neck veins and peripheral edema. I believed that the peripheral edema might have been due in part to a low serum protein, but it turned out later on that the serum protein was not quite low enough to account for the edema and that she did have several other things pointing to heart failure. So far as etiology is concerned, the only thing that seemed reasonable was hypertension, which was moderate — 150 systolic, 100 diastolic — when she came in, with some indication that it might have been higher in the past. We discovered later that

she had had asthma for some time. But I still thought that the diagnosis of chronic cor pulmonale was unlikely. For one thing, the asthma was not severe enough or of long enough duration to produce it. Also the electrocardiographic findings, which are usually important in making that diagnosis, pointed to involvement of the left rather than of the right ventricle.

She responded to diuretic therapy. I did not see her after the first four days.

DR. MCKITTRICK: I feel prouder of my diagnostic acumen as a cardiologist than as a surgeon at this point.

DR. PAUL ZAMECNIK: Retroperitoneal sarcoma can be silent outside the bowel and produce bloody ascites. It is not likely to produce a ++++ guaiac test, however.

DR. MCKITTRICK: Do you think it could produce bloody ascites without involvement of the peritoneum?

DR. ZAMECNIK: It might be difficult to see a retroperitoneal growth by peritoneoscopy, but it could produce ascites.

DR. REED HARWOOD: One gets bloody ascites with thrombosis of the portal vein, probably secondary to liver metastasis.

DR. CASTLEMAN: I shall read part of the operative note:

> There was some free fluid in the abdominal cavity, and the small bowel was densely adherent. One loop of small bowel, estimated to be 60 to 75 cm. long, was completely covered with fibrin. There were small abscesses found between the leaves of the mesentery. The biliary tree seemed entirely normal. After the septic area had been opened up, the wound was closed without drainage.
>
> It was impossible to say what was the cause of the sepsis. The right lower quadrant appeared completely free, although the appendix was not visualized. No diagnosis was made. It was thought that mesenteric thrombosis with partial healing could have produced this picture.

Would you like to say anything more at this point, Dr. McKittrick?

DR. MCKITTRICK: The only thing that I can say is that I still do not know what the diagnosis was. But I am sure of one thing, — and Dr. Castleman will bear me out, — multiple small emboli or thrombi in the mesenteric vessels sometimes do not result at once in bowel necrosis; so that the long history does not exclude this diagnosis. I am still intrigued with the bloody fluid. As to what it was, I have no further comment.

CLINICAL DIAGNOSIS

Carcinoma?
Lymphoma?

DR. MCKITTRICK'S DIAGNOSIS

Local gangrene of small bowel with abscess, probably secondary to thrombotic or embolic occlusion of vessels of mesentery.

ANATOMICAL DIAGNOSES

Mesenteric embolism (arterial).
Infarction of small intestine.
Cardiac hypertrophy and dilatation (? hypertensive type or idiopathic congenital).
Mural thrombi: left ventricle.
Thrombosis of mesenteric and portal veins.
Pulmonary infarcts.
Jaundice.

PATHOLOGICAL DISCUSSION

DR. CASTLEMAN: The autopsy showed that this mass was gangrenous, matted together, small bowel, which had resulted from mesenteric arterial embolism. There was also venous thrombosis, which was probably secondary to the arterial thrombosis. The source of the emboli was the left ventricular cavity. The heart was moderately enlarged. We could find no evidence of intrinsic heart disease except that there were numerous thrombi attached to the left ventricular wall in among the trabeculae carneae without underlying infarction, an extremely unusual condition. Ordinarily one sees them in the auricles in a patient with heart failure and fibrillation. To find them in the ventricle without myocardial disease is extremely unusual, but they were without question the source of the mesenteric emboli. There was also an extension of the mesenteric venous thrombosis into the portal vein, and many of the radicles of the portal vein throughout the liver contained thrombi. That in itself was not sufficiently extensive to be the cause of the jaundice, but there were numerous infarcts in the lung, and certainly the combination of infarction of the lungs and liver disease was enough to produce jaundice.

I am still intrigued with the type of heart disease. The coronary arteries were perfectly normal. The cardiac enlargement was probably on a hypertensive basis, but I cannot be sure. The left ventricular wall was moderately hypertrophied but the main cause of the enlargement seemed to be dilatation. The right side was not hypertrophied. I do not believe that it was caused by the repeated attacks of asthma.

DR. WILLIAMS: What did the myocardium show?

DR. CASTLEMAN: It was normal. There was no underlying infection or infarction.

The thrombi were not particularly adherent to the wall, and I wonder whether the treatment that she got for the heart failure — the digitalis and quinidine — might have produced mural thrombi. Does that ever occur?

DR. WILLIAMS: It is difficult to say. It has never been reported, to my knowledge. The reason I asked about the microscopic picture is that in Fiedler's (or "isolated") myocarditis[1] such mural thrombi have been reported as a frequent complication.

DR. CASTLEMAN: There was no evidence of myocarditis. The only other possibility is idiopathic

congenital hypertrophy of the heart in adults, such as the cases reported by Levy.[2] In these cases there are ventricular thrombi, but in his cases and the two that we have had the heart was enlarged to 600 or 700 gm. Here it weighed about 400 gm.

DR. WILLIAMS: Was the ventricular wall thickened?

DR. CASTLEMAN: Slightly.

REFERENCES

1. Fiedler, A. Über akute interstitielle Myokarditis. *Zentralbl. f. inn. Med.* 21:212, 1900.
2. Levy, R. L., and Rousselot, L. M. Cardiac hypertrophy of unknown etiology in young adults. *Am. Heart J.* 9:178-195, 1933.

CASE 30112

PRESENTATION OF CASE

First admission. A forty-five-year-old married social worker entered the hospital because of pain in the back.

Six years before entry she had had an attack of vague gastrointestinal symptoms, with epigastric discomfort and gas. Three years later she had had recurrence of the symptoms as well as occasional sour regurgitations and vomiting. She gradually improved and became essentially well until eighteen months before entry, when she developed pain low in the back and felt extremely tired. She lost about 24 pounds in two or three months. Three months before admission she had had a recurrence of the pain in the back and had also developed epigastric pain. She had had the menopause at the age of thirty-eight.

Physical examination showed a well-developed, well-nourished woman. The heart and lungs were normal. There was marked tenderness without spasm or masses in the left upper quadrant. Examination of the spine was negative, as were the pelvic and rectal examinations.

The blood pressure was 110 systolic, 70 diastolic. The temperature, pulse and respirations were normal.

Examination of the blood showed a red-cell count of 4,440,000, with 13.6 gm. of hemoglobin. The white-cell count was 9300, with 57 per cent neutrophils. The urine was negative. The stools gave a ++++ guaiac test.

X-ray examination of the lumbar spine and pelvis showed only some new-bone formation about the lateral margins of the right sacroiliac joint. A gastrointestinal series showed, on the lesser curvature just distal to the angle of the stomach, a 2.5-cm. irregular crater with considerable peripheral swelling.

On the thirty-sixth hospital day a subtotal gastrectomy was done. The pathological diagnosis was colloid carcinoma, with metastases to the regional lymph nodes. Postoperatively there was some pain in the abdomen and back, but this disappeared and she was discharged on the fourteenth hospital day.

Second admission (one year later). Following discharge she had had considerable morning nausea and lack of appetite but had carried on until three days before admission, when she developed persistent pain in the left lower quadrant that radiated to the left side of the back. On the day of admission she vomited once. The bowel movements had not been altered.

Physical examination revealed tenderness in the left quadrant. The pelvis showed marked tenderness on motion of the cervix and in the posterior cul-de-sac and a 2-cm. hard tender mass in the right vault. There was considerable vaginal discharge.

The pulse, respirations and temperature were normal.

The white-cell count was 11,100. The urine showed a + test for acetone, a + test for albumin, and the sediment contained occasional red cells and white cells.

X-ray films of the abdomen and chest were negative. No bone metastases could be seen. An intravenous pyelogram was essentially negative. A vaginal smear showed many *Trichomonas vaginalis*.

The patient's condition improved considerably, and she was discharged on the fourth day.

Third admission (twenty-one days later). Following discharge she had continued to vomit three or four times daily. The vomitus consisted of bile-stained fluid without solid material. She had had some diarrhea. Four days before admission she had an episode of vaginal bleeding. She passed several clots for the next three days and then stopped spontaneously. There was no pain or cramps.

Physical examination showed a thin cachectic woman in no distress. There was moderate tenderness to deep palpation in the entire left abdomen. Pelvic examination showed a normal cervix, a very small uterus and a large round, solid, somewhat fixed, but movable mass in the right vault.

The temperature, pulse and respirations were normal. The blood pressure was 122 systolic, 80 diastolic.

The red-cell count was 3,510,000, with 80 per cent hemoglobin. The white-cell count was 8000, with 56 per cent neutrophils. The urine was essentially negative.

A gastrointestinal series, x-ray films of the chest and intravenous pyelograms were negative.

An operation was performed on the sixth day.

DIFFERENTIAL DIAGNOSIS

DR. GORDON A. DONALDSON: Throughout the course of this case history there is one complaint that persisted — pain in the lower part of the back, which continued as such for one and a half years. For the month previous to the final episode it was more marked on the left side and was associated with left lower abdominal pain and tenderness. This latter type of pain suggests disease in the pelvis.

At first, when I read the abstract, the colloid carcinoma of the stomach appeared to be a red her-

ring. She gave a perfectly typical history for carcinoma of the stomach: she had had vague gastrointestinal symptoms and epigastric discomfort for six years; she had gradually developed epigastric pain, regurgitation and vomiting; and she had lost 24 pounds in weight. There was, however, little anemia, indicating that the carcinoma was probably an early one. She did come to operation and had a subtotal gastrectomy with an uneventful convalescence. The regional lymph nodes, surprisingly enough, were found to contain cancer.

Another feature that we note about the first admission is that they were interested in the lumbar spine and pelvis and found that, by x-ray, she did have changes about the sacroiliac joint on the right side. This would help to explain the pain in the back for the previous one and a half years. We must therefore keep in mind the facts that she had a definite pathological diagnosis of colloid carcinoma in the upper abdomen and that she had x-ray changes in the pelvis.

That takes us up to the second and third admissions, at which time attention was directed to the lower abdomen and pelvis. Her pain had changed, being more intense on the left side. She also had a mass on the right side of the pelvis and bleeding. Painless bleeding associated with clots of four days' duration in a woman who is seven years after the menopause is quite significant. I do not believe that the mass was in the gastrointestinal tract, nor do I believe that she had diverticulitis of the sigmoid, since she had no elevation of the white-cell count, temperature or pulse. In spite of the vomiting she was able to swallow barium for a gastrointestinal series, which showed a normal upper intestinal tract. Moreover, the genitourinary tract was normal by x-ray. So we have a rapidly growing mass in the right pelvis and pain in the left side.

I wonder if we could see the last gastrointestinal series. Does it help?

DR. LAURENCE L. ROBBINS: No; it does not show the mass particularly well, and most of the films are of the gastric anastomosis and not in the region of the mass.

FIGURE 1. *Photomicrograph of the Krukenberg Tumor.*

DR. DONALDSON: I should like to blame all her trouble at the last admission on the mass in the right side of the pelvis. The uterus was described as extremely small — a postmenopausal uterus. So I doubt whether there was anything in the uterus that initiated the bleeding. In addition, the cervix was normal. This mass could have been the right tube, in which case it must have had a tumor in it. Carcinoma of the tube may cause bleeding, but it usually consists of occasional spotting. Such a tumor is rare and is extremely unlikely in this case.

So we come down to the fact that the right ovary was pathologic, and again I do not believe that there was any inflammation in the ovary because of the clinical picture. In fact the whole picture fits much better with carcinoma. The patient had anemia and was cachectic. What sort of tumor could this have been? A granulosal-cell tumor can cause her bleeding, but it is usually not massive for four days, and the patient had none of the secondary changes that one generally associates with granulosal-cell tumor. Also the tumor grew quite

rapidly, — a matter of three weeks, — so I rule that out.

Another possibility is a Krukenberg tumor. The patient had a colloid carcinoma of the stomach, the cells of which are histologically similar to those that Krukenberg described, and I think this might well fill the bill. The left-sided pain and fullness in the cul-de-sac could be disease in the other ovary, which was not definitely palpable. Krukenberg tumors are often bilateral. It may not be necessary to say just what sort of tumor this was; but I believe it was a carcinoma of the right ovary, for which operation was undertaken.

Dr. Joe V. Meigs: Our reasoning was similar to that of Dr. Donaldson. When I examined the patient, I was not at all sure that the mass was one-sided. It moved freely with the uterus, and most of us thought that it was connected with the uterus. We had a difficult time explaining why the patient bled. We brought up the possibility of a Krukenberg tumor and advised that she be peritoneoscoped. At peritoneoscopy Dr. Benedict thought that the tumor was a fibroid.

Clinical Diagnosis

Fibroid uterus.

Dr. Donaldson's Diagnosis

Krukenberg tumor of ovary.

Anatomical Diagnosis

Krukenberg tumor of ovaries.

Pathological Discussion

Dr Benjamin Castleman: The specimen that we received included a small uterus, almost small enough to be called an infantile uterus, and two large masses, one on the right side, measuring 9 cm., and one on the left, measuring 5 cm. The surface of the tumors was smooth and moderately firm. On section the masses showed a firm, smooth, sarcomatous appearance, which is the classic picture of the Krukenberg tumor. In fact when the tumor was first described by Krukenberg* it was thought to be a sarcoma rather than a carcinoma. Microscopic examination showed a signet-ring type of carcinoma (Fig. 1). The uterus had a hyperplastic endometrium, which may have been the cause of the bleeding. We later found out that a vaginal smear showed an estrogen effect, which brought up the possibility, before we knew that there was endometrial hyperplasia, whether such a carcinoma can produce an estrogen effect.

Dr. Meigs: In my investigations of ovarian tumors in women past the menopause I have found that any type of tumor may be accompanied by uterine bleeding. Why, I do not know.

Dr. Arthur Hertig: If the stroma of the tumor was involved, it might have produced an estrogen effect. It is a far cry, but it may be analogous to the estrogenic quality of the ovary. I never believed that Krukenberg tumors put out estrogen. Perhaps they do.

Dr. Meigs: I looked carefully and found no evidence of follicle cyst. I have seen Krukenberg tumors that had cysts with perfectly good epithelium, which might secrete estrin.

Dr. Castleman: We did not find any cysts. I do not know why she had endometrial hyperplasia, but that was probably the direct cause of the bleeding.

Dr. Maurice Fremont-Smith: The vaginal smear showed *Tr. vaginalis*, which sometimes gives the appearance of an estrogen effect in the vaginal smear.

*Krukenberg, F. Ueber das Fibrosarcoma ovarii mucocellulare (carcinomatodes). *Arch. f. Gynäk.* **50**:287-321, 1895.

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EPIDEMIC STARVATION

The countries of occupied Europe are faced with potential postwar problems that run the entire gamut of political, economic and social questions of the most vital import. None will be more fundamental or more pressing than those dealing with the nutritional status of liberated populations. In any war, starvation has invariably accompanied prolonged hostilities; conquest and occupation have always caused suffering and want. Mass starvation has rarely, if ever, been distributed so ruthlessly or so systematically to civilian populations as has been the case in occupied Europe in the present struggle. The will to resist has been directly attacked in this total war by all the means possessed by a force that is purposeful and entirely without conscience. In concentration camps repressive measures have been most systematically carried out, with results that, for the most part, are still matters of conjecture rather than of carefully documented and exact knowledge. Prolongation of hostilities in Europe through another six to twelve months will exaggerate to an unprecedented degree the processes of attrition that have been initiated in concentration camps and among civilian populations in occupied areas. Reconstruction problems among the exhausted survivors will tax to the full the resources of the United Nations if a restoration of health and morale is to be obtained for the victims of Nazi tyranny. To what extent mass malnutrition may affect postwar thinking on the Continent can hardly be estimated. Since it is certain that chronic nutritional deficiency is not conducive to normal emotional or intellectual performance, adequate and carefully planned feeding of European sufferers will be a matter of stern necessity.

The clinical aspects of epidemic starvation are clearly described in the report from southern France published elsewhere in this issue of the *Journal*. The specific manifestations of extreme avitaminosis, protein starvation, lack of hematopoietic factors and insufficient caloric intake, with the modifying effects of intercurrent infection, are graphically presented. Both from the humanitarian and the scientific points of view the article is of immediate current interest and should be carefully scrutinized with attention.

RELIGION AND PSYCHIATRY

The question of the relation, if any, between psychiatry and religion is now and again propounded by someone of speculative mind. The proposal of such a question might be considered a compliment to the "mental sciences" or it might be looked on as an attack on the body of knowledge that professes to have insight into the deepest, basic motives of human activity.

Religious belief of some kind or other is as old as human nature and antedates the earliest beginnings of scientific inquiry. Psychiatry is a fairly young member of the scientific family. Does this child,

psychiatry, dare or insist on classifying the tendency toward religious belief as founded in phantasy, delusion, wishful thinking? Is religion what Karl Marx called it, "the opium of the people"?

Most psychiatrists are familiar with the criticism that their branch of medicine analyzes its patients' problems, points out weaknesses and frailties and concludes with unhelpful advice comparable to "Now it's up to you." This process supposedly leaves the patient with nothing to stand on or build upon and he must look in other fields if he is to find substantial help in his suffering. It is doubtful that such uninspiring and barren therapy is practiced frequently, and certainly the goal and standards of the best psychotherapy are constructive, not analytic alone. Therapy in psychiatry, as in all of medicine, should include an understanding of the art as well as of the science.

The propounder of the original question may say that this is well enough; perhaps psychotherapy does mean to be constructive, even though he knows of cases in which it was not, but he wants to get down to brass tacks, so to speak, and asks searchingly if psychiatry believes in and accepts the existence of a supreme or supernatural being, God, and in its therapeutic attempts uses this belief or concept in such manner that its patients learn that belief and faith in this existence are essential to their cure.

It may be assumed that they who do have a firm belief in the reality of an infinite being think that such faith is good. They do not berate themselves for having it and they are inclined to think that others would benefit in having the same conviction. They also would say that such trust is not selfish; that, on the contrary, it tends to make them more mindful of others. It is not compatible with religious belief for a person to be thankful that he, anyway, has his salvation whatever happens to the hindmost. The really religious person is concerned about and wants to help others.

Anyone knows, to use that surprisingly inclusive phrase, that being primarily interested in getting the biggest piece of cake for oneself is not good, farsighted or wise. Psychiatry has found and has taught for years that in so far as the patient's troubles or maladjustments are not due to innate or organic abnormalities they are dependent on the formative experiences of the early years of life. How a person meets this or that crisis or strain has a direct relation to what he has learned about self-control: to what extent he has gained the perspective which enables him to understand that his egotistic desires and needs may be of minimal importance in a vast universe of time and space.

Psychiatry has always known and taught that having and acting on the knowledge that there is something more important than the self makes for mental health. Geniuses, in varying degrees, may be exceptions, in that their egotistic desires may, in the long run, benefit others enough and more than enough to compensate for the headaches given their immediate associates by their personal idiosyncrasies and selfishnesses.

If good deeds, spontaneously performed, not done because Dale Carnegie says it works, plus a humility that finds others' accomplishments as stimulating, or nearly so, as one's own, plus a perspective out of which comes graceful acceptance of one's own frustrations, plus the conviction that one should do one's job well, whether or not one knows just why — if these sum up to religion, then psychiatry and religion are going in the same direction. If the questioner insists on absolute belief in God as a personality, there may be variance.

There is nothing to indicate that the psychiatrist who does not believe in God does not help his patients. There is nothing to indicate that the psychiatrist who believes in God is a better helper of his patients. Too frequently such a belief is rooted in egotism that cannot face the idea of a universe's going on with one's personal identity gone. It may be remembered, too, that preaching and argument are not always effective. Unostentatious example may carry farther. The old horse-water-drink problem is relevant.

Psychiatry, in therapy, does not want to take away from people their trust in God. It would prefer that they have it or that they achieve it if it can help them. To tell patients, however, that they must have such trust before they can be cured, or to base therapy on such prejudice, even though it might not be expressed in so many words, would be as uncharitable, and often as unprofitable, as

insisting on religious conversion before allowing drink or food to a starving man.

We are at one with God if we are more interested in the welfare of others than we are in personal needs, if the latter are of a kind from which nothing emanates except increased need.

MEDICAL EPONYM

Wernicke's Disease

The original account of this condition, by Carl W. Wernicke (1848–1905), at that time *Privat-dozent* at the University of Berlin, appears in his *Lehrbuch der Gehirnkrankheiten für Aerzte und Studirende* (Kassel and Berlin, 1881: Vol. II, pages 229 to 242), under the title "Die acute, hämorrhagische Poliencephalitis superior [Acute Hemorrhagic Superior Polioencephalitis]." A portion of the translation follows:

> We are here dealing with an independent inflammatory, acute disease of the nuclei of the nerves supplying the eye muscles, which results in death within a period of ten to fourteen days. The localizing symptoms consist in associated ocular muscle palsies, which appear suddenly, progress and lead finally to almost complete paralysis of the eye muscles. Certain muscles, however, such as the sphincter iridis or the levator palpebrarum, are spared. The patients' gait becomes uncertain, showing a combination of stiffness with ataxia, usually suggesting the ataxia of the alcoholic. The general symptoms are striking, and consist in disturbances of consciousness, either somnolence from the outset, or an end stage of somnolence introduced by a more prolonged period of agitation. Further, in all 3 cases there was involvement of the optic nerve, consisting of inflammatory changes in the papilla.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

DEATHS

BRADY — William F. Brady, M.D., formerly of Holyoke, died February 28 at his home in St. Petersburg, Florida. He was in his fifty-ninth year.

Dr. Brady received his degree from Tufts College Medical School in 1909. He interned at the Boston City Hospital and at the Providence Hospital, later studying abroad at the University of Vienna. He was elected to the American College of Surgeons in 1937. He was a member of the Massachusetts Medical Society, the American Medical Association and the Holyoke Medical Association.

His widow, his mother and a sister survive.

HOWARD — Margaret E. P. Howard, M.D., of Reading, died March 1. She was in her eighty-fifth year.

Dr. Howard received her degree from the University of Michigan Medical School in 1882. She was a member of the Massachusetts Medical Society and the American Medical Association.

A son and two grandchildren survive.

PALMER — Anna C. Palmer, M.D., of Milton, died February 10. She was in her eighty-seventh year.

Dr. Palmer received her degree from Boston University School of Medicine in 1888. She was president of the Cured Cancer Club and a member of the Massachusetts Medical Society and the American Medical Association.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

COMMUNICABLE DISEASES IN MASSACHUSETTS FOR FEBRUARY, 1944

Résumé

Diseases	February 1944	February 1943	Seven-Year Median
Anterior poliomyelitis	0	0	0
Chancroid	3	*	*
Chicken pox	2754	1279	1438
Diphtheria	26	8	11
Dog bite	592	511	531
Dysentery, bacillary	12	6	6
German measles	188	3491	80
Gonorrhea	390	345	326
Lymphogranuloma venereum	*	*	*
Measles	1875	2661	1896
Meningitis, meningococcal	61	49	8
Meningitis, Pfeiffer-bacillus	2	0	1
Meningitis, pneumococcal	5	3	†
Meningitis, streptococcal	1	0	†
Meningitis, other forms	7	1	†
Meningitis, undetermined	6	4	†
Mumps	1092	1113	777
Pneumonia, lobar	356	323	519
Salmonella infections	1	3	2
Scarlet fever	1777	2080	1002
Syphilis	457	363	374
Tuberculosis, pulmonary	286	165	176
Tuberculosis, other forms	25	14	14
Typhoid fever	2	2	5
Undulant fever	1	1	3
Whooping cough	341	658	779

*Made reportable in December, 1943.

†Pfeiffer-bacillus meningitis only other form reportable previous to 1941.

Comment

Thirteen diseases exceeded the seven-year median during February. Three of these call for special mention: diphtheria, meningococcal meningitis and scarlet fever.

Diphtheria has been commented on before. The increase in cases that has been taking place the last few months must be laid, at least in part, at the door of laxness in immunization. Meningococcal meningitis this month reached the point of 61 cases — more than seven times the seven-year median. There was, however, a sizable drop from January's 94 cases. Scarlet fever is following the usual seasonal pattern but at a lower level than that of last year. It is, nevertheless, well above the level of the seven-year median.

Geographical Distribution of Certain Diseases

Actinomycosis was reported from: Fall River, 1; Fort Devens, 1; total, 2.

Anthrax was reported from: Franklin, 1; Peabody, 1; total, 2.

Diphtheria was reported from: Arlington, 1; Boston, 6; Everett, 2; Lawrence, 10; Melrose, 3; Somerville, 4; total, 26.

Dysentery, bacillary, was reported from: Beverly, 1; Boston, 2; Worcester, 9; total, 12.

Encephalitis, infectious, was reported from: Holyoke, 1; Mansfield, 1; total, 2.

Hookworm was reported from: Edgartown, 1; total, 1.

Malaria was reported from: Amesbury, 1; Amherst College, 1; Boston, 1; Camp Edwards, 3; Cushing General Hospital, 4; Fort Banks, 13; Fort Devens, 25; Gardner, 1; Worcester, 1; total, 50.

Meningitis, meningococcal, was reported from: Barnstable, 2; Boston, 12; Brockton, 1; Cambridge, 1; Camp Edwards, 4; Easton, 1; Everett, 1; Fall River, 1; Fitchburg, 1; Fort Banks, 1; Lawrence, 1; Lowell, 5; Lynn, 2; Malden, 2; Middleboro, 3; Montague, 1; Newton, 1; Quincy, 1; Revere, 1; Sharon, 1; Somerville, 2; Southbridge, 1; Springfield, 1; Swampscott, 1; Wakefield, 1; Waltham, 1; Ware, 1; Webster, 2; Wellesley, 1; Westfield, 1; Winchester, 1; Worcester, 4; Wrentham, 1; total, 61.

Meningitis, Pfeiffer-bacillus, was reported from: Boston, 1; Needham, 1; total, 2.

Meningitis, pneumococcal, was reported from: Billerica, 1; Boston, 1; Lawrence, 1; Sutton, 1; Springfield, 1; total, 5.

Meningitis, streptococcal, was reported from: Beverly, 1; total, 1.

Meningitis, other forms, was reported from: Boston, 3; Cambridge, 1; Gloucester, 2; Lynn, 1; total, 7.

Meningitis, undetermined, was reported from: Attleboro, 1; Cambridge, 1; Everett, 1; Quincy, 2; Springfield, 1; total, 6.

Salmonella infection was reported from: Newton, 1; total, 1.

Septic sore throat was reported from: Boston, 10; Camp Edwards, 2; Cushing General Hospital, 1; Lowell, 1; Lynn, 3; Marion, 1; Medford, 1; North Adams, 1; Quincy, 1; Revere, 1; Williamstown, 1; total, 23.

Tetanus was reported from: Lawrence, 1; total, 1.

Trachoma was reported from: Boston, 1; West Newbury, 1; total, 2.

Trichinosis was reported from: Boston, 1; Medfield, 1; total, 2.

Typhoid fever was reported from: Beverly, 1; West Brookfield, 1; total, 2.

Undulant fever was reported from: Oxford, 1; total, 1.

WAR ACTIVITIES

PROCUREMENT AND ASSIGNMENT SERVICE

Monetary Aid for Relocations

The Washington office of the Procurement and Assignment Service has recently announced that Congress has authorized a fund of $200,000, to be administered by the United States Public Health Service, for the relocation of physicians and dentists. Payments of $250 a month for three months, as well as the costs of transportation, will be paid to physicians and dentists who desire to relocate, and the officials of the Public Health Service will work in close co-operation with state medical and dental chairmen.

MISCELLANY

TUBERCULOSIS AMONG VETERANS

Our national experience with tuberculous veterans of the last war has been unfortunate. Sadder still would be a repetition involving the men and women fighting World War II. The following paper (Dublin, L. J. Function of health officer in control of tuberculosis among veterans. *Am. J. Pub. Health* 33:1425-1429, 1943) addressed originally to health officers, challenges every physician whose practice embraces a tuberculous veteran or the family of one.

During World War I inductions, knowledge and facilities for diagnosis were insufficient to screen out many men suffering from tuberculosis, particularly presymptomatic disease. Thus, many active cases entered the Army. Hardships of training and combat produced still more. After the war, care of tuberculous veterans fell to the newly organized Veterans' Bureau. Hospitals and sanatoriums were erected. The service became a major medical activity of the Bureau, and of its successor, the Veterans' Administration. As early as 1923, a total of 23,653 tuberculous veterans were admitted to treatment in one year. At first, care was limited to tuberculosis connected with military service. Subsequently, cases with disease unrelated to military service became eligible. As a result, tuberculosis admissions have continued numerous. During fiscal 1942, after almost a quarter century, hospital admissions numbered 9658. Over 300,000 such admissions and readmissions have accrued in hospitals of the Veterans' Administration or other government, state and civil institutions since the last war.

The government has spared no efforts or funds in erecting and equipping modern hospitals and in providing adequate medical personnel. In March, 1942, there were 5217 beds to meet current needs, embracing tuberculous veterans of the present war and including tuberculosis beds in veterans' psychiatric hospitals. Besides having all costs of hospitalization and transportation to hospitals paid, tuberculous veterans also receive compensation payments scaled from $8 to $100 per month, based on varying grades of dependency and service-connected or nonservice-connected disability. Men treated at home may qualify for an additional $50 per month payable to the wife or other attendant. These provisions have tempted many to discontinue hospital care and attempt a cure at home.

Standards of operation in veterans' hospitals are generous. In 1942, excluding overhead, the per diem cost of operation was $4.37 per patient and the total direct costs of treatment approached $8,000,000. Compensation of World War I veterans with partial or total disability due to tuberculosis, whether or not service-connected, amounted to approximately $40,000,000 during that fiscal year. Such veterans then still numbered 63,000, and exceeded by many times the number accepting hospital care. Disability payments over the last twenty-five years aggregate about $1,000,000,000.

Despite the admirable services available to tuberculous veterans, the experience of their hospitals has been unfavorable. Thus, in 1942, of the 9854 cases discharged from these hospitals, only 1.9 per cent were designated "arrested" at discharge, with 0.3 per cent "apparently arrested" and 0.8 per cent "quiescent" — a bare total of 3 per cent medically rehabilitated. The remaining discharges included: "condition improved" 32.7 per cent; "condition unimproved" 28.9 per cent; "dead" 19.5 per cent; and "condition not stated" 16.0 per cent. The vast majority were obviously not ready for release. So-called "improved" cases represent, predominantly, patients with unstable lesions, a large proportion leaving the hospital without authorization or consent. Thus, the Veterans' Administration itself classified the hospitalization of 58 per cent of the cases as "incomplete." These 1942 figures are rather typical, although somewhat worse than those of earlier years.

Exact comparisons among various sanatoriums regarding results of treatment on the basis of such crude figures are impossible, particularly now when World War I veterans admitted are older men, usually with chronic disease. Of recent admissions, only 4 per cent were "incipient" cases, 22 per cent "moderately advanced," and 74 per cent "far advanced." Even so, there is a painful contrast between the results with veterans and those achieved in well-managed state, municipal and private sanatoriums. In a 1933–1934 survey of tuberculosis hospitals and sanatoriums in the United States by the American Medical Association, patients discharged with tuberculosis "arrested," "apparently arrested" or "quiescent" accounted for 29 per cent of all discharged. Among Michigan state sanatoriums from 1930 to 1934 discharges included 61 per cent in these three groups. At Mount McGregor Sanatorium of the Metropolitan Life Insurance Company, of males discharged between 1919 and 1936, and excluding incipient cases, 48 per cent were in comparable categories. Even for cases far advanced on admission, the proportion was 34 per cent.

This deplorable situation among tuberculous veterans has not developed from lack of desire to help the men. Everyone concerned aimed at optimum care. *The chief failure was by legislators and others interested in veteran welfare to appreciate fundamental conditions necessary for effective treatment.* In part, outside pressure was brought to bear to liberalize financial provisions. These measures actually have minimized effective control over the movement of the tuberculous. Veterans, not subject to ordinary hospital restrictions, come and go almost at will, regardless of their condition and against medical advice. Patients have been readmitted as many as twenty-four different times. Six to eight admissions of the same man are common despite official effort to educate and persuade patients to complete their hospital care, and measures to exclude offenders from immediate rehospitalization. Much of the discipline essential to success in treating tuberculosis is lacking. Indeed, laws and practices have so evolved that it often financially benefits men to leave the hospital or avoid it altogether. This creates an impossible situation, undermining morale of veterans and professional staff alike.

More serious than mere failure to rehabilitate the patient, discharge before cure exacts its toll on the Nation. It has allowed thousands with communicable tuberculosis to return to civilian communities, to live at home or travel about under little or no medical supervision. State and local health officers have assumed little responsibility for men traditionally regarded as wards of the federal government. Few patients have recovered; most have constituted an army of discouraged men spreading tuberculosis in their home communities.

Administration authorities and veterans' leaders are recognizing the need for a remedy, beginning with a drastic change in viewpoint. Specific improvements are being considered and necessary legislative measures will be debated. The American Legion is launching a campaign through its local branches to see that veterans resume and continue hospital treatment until discharged with medical approval.

What is to be done? First, new controls must render liberal benefits medically effective, preventing the drifting of tuberculous veterans until the disease is "arrested" or, at least, not a menace.

Second, the medical profession must co-operate with the Veterans' Administration in the follow-up of tuberculous expatients. The Administration has indicated that it will release information to state and local health officers, and routines for getting such reports are imperative. Men still in need of sanatorium care who will not stay in veterans' institutions should be hospitalized in state or local sanatoriums, with legal power invoked where necessary. Each man's circle of contacts should be thoroughly combed for additional cases.

Finally, a genuine effort must be made to protect the large crop of tuberculous veterans inevitable from the present war. It is likely that the Veterans' Administration will function under regulations and procedures governing the care of veterans of World War I. Already, many of the tuberculous veterans of the new war show the same restlessness and abandonment of hospital care that have produced calamitous results among the older men. With new cases already numerous, the stage may be set for another great medical tragedy. Lack of discipline and mistaken generosity may not only take their toll of young men who deserve to get well and resume useful lives, but may seriously delay control of tuberculosis in the general population — unless we act! — Reprinted from *Tuberculosis Abstracts* (March, 1944).

BOOK REVIEWS

Virus Diseases. By members of the Rockefeller Institute for Medical Research. 8°, cloth, 170 pp., with 11 illustrations and 2 plates. Ithaca, New York: Cornell University Press, 1943. $2.00.

This book consists of six lectures that were delivered by members of the Rockefeller Institute for Medical Research at Cornell University in the spring of 1942. The titles of the lectures were as follows: "Virus Diseases, with Particular Reference to Vaccinia," by Dr. Thomas M. Rivers; "Chemical Structure and the Mutation of Viruses," by Wendell M. Stanley, Ph.D.; "New Hosts as a Key to Progress in Plant Virus Disease Research," by Louis O. Kunkel, Ph.D.; "Swine Influenza," by Dr. Richard E. Shope; "Human Influenza," by Dr. Frank L. Horsfall, Jr.; and "Viruses and Tumors," by Dr. Peyton Rous. Excellent bibliographies are appended to each lecture. An understanding of the contents of this volume is furnished by a quotation from the foreword:

> Numerous papers regarding viruses have appeared in scientific journals. Many new virus diseases have been discovered in recent years. Virus workers are not always in agreement and the same virus worker not infrequently changes his notions. Thus, the realm of viruses and virus diseases reminds one of a boom town; nothing is settled. As a result of this confusion, few investigators have had the temerity to write books about viruses. Nevertheless, many facts about these peculiar agents have been established and are sufficiently interesting and important to warrant being brought together under one cover. In this set of Messenger Lectures, six virus workers have attempted to do this for the fields with which they are familiar.

Kaiser Wakes the Doctors. By Paul de Kruif, M.D. 8°, cloth, 158 pp. New York: Harcourt, Brace and Company, 1943. $2.00.

Paul de Kruif is an enthusiast, and when one reads the writings of such he must be on his guard against being "taken in." There is a seed of truth in most of his writings, but all too often the seed is enlarged into a nonexistent tree.

In reading this book one must admit that the medical care given to the Kaiser employees is excellent. Dr. Garfield and his group have used the best of organized medical facilities to care for the sick and injured among the thousands of employees, the scheme being financed by a prepayment plan in which both employer and employee participate. It differs little from other prepayment plans already in operation, such as the Endicott-Johnson, the Sante Fe and the Birmingham Coal. The factor of drama that enabled de Kruif to write a book is the sudden growth, which directly paralleled the mushrooming of the Kaiser plant.

This book is not an indictment of existing medical care in the United States. If anything it shows that American medicine under the system of individual initiative can formulate methods for meeting any emergency, and it is doubtful, at least to the reviewer, if any form of bureaucratic medicine could have handled the problem nearly so well as the present competitive system.

Paul de Kruif has read the final report of the Committee on the Costs of Medical Care, in which it is stated that prepayment and group practice are essential. But beyond this, and of greatest importance, is the recognition that the tactics must vary with the needs and facilities of the communities that are to be served. De Kruif has described one method, but in a vast country like the United States no single method will serve. Each small unit must build upon existing facilities to enlarge medical care, and when this is done it may result in a voluntary insurance scheme for covering the costs of medical care, in an industrial prepayment plan or even in direct government subsidy, but not one to the exclusion of all others.

Biochemistry of the Fatty Acids, and their Compounds, the Lipids. By W. R. Bloor. American Chemical Society Monograph Series. 8°, cloth, 387 pp. New York: Reinhold Publishing Corporation, 1943. $6.00.

The scope of this authoritatively written monograph is best shown by a citation of its chapter titles: "Chemistry," "Digestion and Absorption," "Lipids of the Blood," "Lipids in the Tissue," "Lipid Metabolism" and "Lipids of Secretion and Excretion." The emphasis of the book is on the physiology rather than on the chemistry of the lipids, and it thus makes a valuable guide for those interested in the borderlands of chemical physiology and medicine. The chapter on absorption and the one on blood lipids are especially well conceived and presented.

Oral Diagnosis with Suggestions for Treatment. By Kurt H. Thoma, D.M.D. With contributions by Fred Trevor, D.M.D., Henry Goldman, D.M.D., and David Weisberger, D.M.D. Second edition, revised. 8°, cloth, 495 pp., with 666 illustrations, 63 of them in colors. Philadelphia and London: W. B. Saunders Company, 1943. $6.75.

The second edition of this book has been revised and renamed, the original edition having been called *Oral Diagnosis and Treatment Planning.*

Additions include a new chapter on wounds and burns, elaboration of the chapter on fractures of the teeth and jaws, and chapters on environmental changes in the teeth and on diseases of partially and completely edentulous mouths, as well as contributions by Drs. Trevor, Goldman and Weisberger on dental caries, periodontal disease and the relation of constitutional disease to oral lesions.

The volume is profusely illustrated, many of the illustrations being unusually clear cut so that even the finer details of the lesions are observable.

The book covers diseases and abnormal conditions of the teeth, jaws and other organs and tissues of the mouth, with suggestions for treatment at the end of each chapter. The arrangement represents a useful and constructive departure from the usual textbook. The therapy both for local lesions and for constitutional and deficiency conditions is brought up to date and given in detail.

The volume is recommended primarily as a textbook for the dental student in the courses covering oral diagnosis or oral medicine, now considered so vital in dental education. As a reference book for the dental practitioner it should stimulate an interest in the relation of oral lesions to disease elsewhere in the body. The physician and medical student could well make use of this book, particularly since oral disease, with its related dental problems, is a neglected field in the medical curriculum.

(*Notices on page xi*)